

THE THREE STOOGES

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INSTRUCTION MANUAL

ADDENDUM

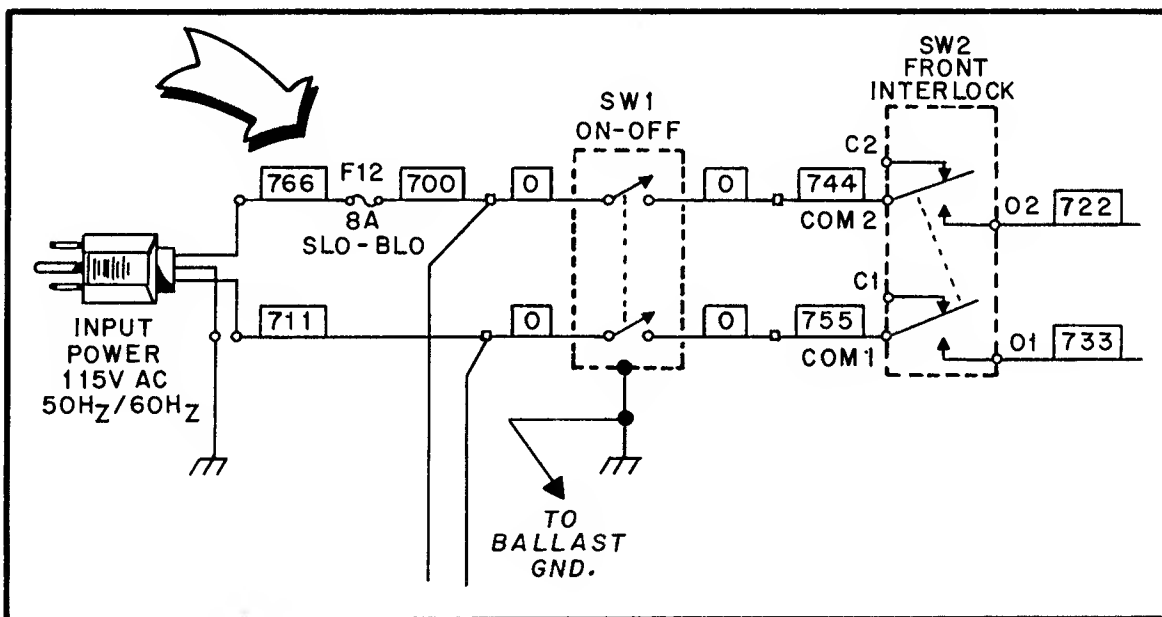
ATTACHED TO AND PART OF THE THREE STOOGES (GAME GV-113) INSTRUCTION MANUAL

GAME AS SHIPPED VARIES FROM THE INSTRUCTION MANUAL AS PRINTED

1. Add the following to VIII. GENERAL INFORMATION--C. FUSES--BOTTOM PANEL on page 9 of the instruction manual:

F12 INPUT LINE FUSE 8 Amp SLO-BLO PART NO. EL-26

2. Make the following changes as shown in the figure below, in the partial illustration of the PRIMARY POWER/FILTER BOARDS/INTER-CONNECTION DIAGRAM schematic on pages 30, 31 and 32 in the instruction manual:
 - a) Add fuse F12 to the POWER INPUT LINE as shown in the figure below.
 - b) Change wire color 700, between POWER LINE INPUT and F12 to 766, add wire color 700 from the F12 Fuse (Output Side), to the junction of the 0 wire which is part of SW1 and wire 700 which goes to A12J2-1



THE THREE STOOGES (GAME GV-113) INSTRUCTION MANUAL

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WELLS GARDNER MONITOR, SERVICE AND OPERATION MANUAL (Attached)	

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference."

NOTICE

WARRANTY INFORMATION IS LOCATED ON THE INSIDE BACK COVER

OR SERVICE, CALL TOLL FREE: 1-800-323-9121; (ILLINOIS) 1-800-942-1

I. INSTALLATION

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A. SET-UP

1. Carefully inspect the exterior of the game for any damage which might have occurred during shipment.
2. Unlock and open the rear cabinet door.
3. Check that all plug in connectors are seated firmly. The connectors are keyed so they will only go in one way.
4. Remove the binding strap from the line cord, and install the line cord plate in the groove provided.
5. Cabinet levelers (2) are stored within the cash box for shipping purposes. Install and adjust as necessary.

B. CHECK-OUT

1. Check that all cables are free of moving parts.
2. Check for any loose wires.
3. Check for loose solder or foreign matter on switches and power supply assemblies.
4. Be certain all fuses are seated firmly.
5. Be sure transformer wiring corresponds to the supply voltage.
6. Refer to section VI to make all the necessary game adjustments.
7. Reassemble the game.
8. Plug the line cord into a properly grounded 3-wire receptacle ONLY!!

C. CONTROL PANEL REMOVAL

1. Unplug the game.
2. Unlock and open the coin chute door.
3. Reach in through the coin chute door and remove the wing nut and flat washer from each of the two carriage bolts which secure the control panel to the game. Unlatch the control panel latch at the top center of the panel. Note where the latch strike plate is located. Remove the carriage bolts.
4. Pull the control panel back, grasp it at the front edge as far back as it will go (approximately 1/4").
5. Raise the front of the control panel approximately one inch above its supports and lift the entire assembly high enough to disconnect A9J1/A9P1 and A9J2/A9P2.
6. Remove the entire control panel assembly from the game.
7. The joystick's and leaf-switches are now accessible for removal or cleaning.
8. For reassembly, reverse the above procedure.

D. MONITOR REMOVAL

1. Unplug the game.
2. Perform the control panel assembly removal procedure (Section C).
3. Unlock and open the rear cabinet door.
4. NOTE: The color monitor contains HIGH VOLTAGES delivering LETHAL quantities of energy. Do not attempt to service the

I. INSTALLATION, II. INITIALIZATION, III. GAME OPERATION

I. INSTALLATION

monitor until you have shorted the anode plug on the picture tube to ground.

5. Disconnect the video plug A17J1, the monitor power supply plug A12J3/A12P3 and the ground wire from the monitor chassis.
6. From the rear of the game, remove the one nut and one washer from each of the four carriage bolts used to secure the monitor to the platform.
7. Remove the monitor from the rear of the game, being careful to clear all cables from the CRT neck.
8. For reassembly, reverse the above procedure.

E. SPEAKER ASSEMBLY AND MARQUEE REMOVAL

1. Unplug the game.
2. Unlock and open the back door.
3. Unplug the A15-J1/PI connector.
4. Unlatch the two latches on the rear of the Speaker Assembly Panel located inside the back door above the monitor.
5. On the front of the game, pull down on the lower molding under the marquee. The Speaker Assembly will lower to allow removal of the marquee.

6. Remove the marquee by lifting it upward out of its track. The Speaker Assembly and Illumination Assembly are now accessible for servicing.
7. Tilt the front of the Speaker Assembly downward while lifting the center upward.

Pull the assembly straight out to remove. Be careful not to pinch the Speaker Assembly cable.

8. For reassembly, reverse the above procedure. When replacing the marquee:
 - a. Tilt the front of the Speaker Assembly downward.
 - b. Place the bottom of the marquee in the lower molding track on the front of the assembly.
 - c. Apply slight pressure with your thumbs to the lower left and right corners of the marquee.
 - d. Slowly raise the Speaker Assembly until the top of the marquee is in place in the upper track in the top molding.
 - e. Be certain to reconnect the A15-J1/PI connector and relatch the rear assembly latches.

II. INITIALIZATION

TURN GAME ON

Immediately, the coin chute lamps and the speaker marquee lamp will turn on.

AFTER A TEN SECOND DELAY

- A. The attract mode appears on the screen.

- B. The playing field cycles through the following:

1. High Game to Date screen
2. Instruction Set
3. Game Play Cycle

III. GAME OPERATION

A. GAME START

1. Insert coins into coin chute.
 - a. Coin chute tune is played.
 - b. Total credits are displayed on screen.
2. Press one (Larry), two (Moe) or three (Curly) player

button to start game.

- a. Total credits are decreased by one, two or three.
- b. Choose Larry, Moe or Curly by moving the respective joystick.
- c. Game initializes.

III. GAME OPERATION, IV. GAME PLAY AND SCORING

B. ONE PLAYER

1. The player's selected Stooge picture and name is displayed at top of screen.

C. ADDITIONAL PLAYERS

1. Additional players are indicated by their selected Stooge picture and name at top of screen.

D. EXTRA STOOGES

1. Each player will begin with

three Stooges (dependent on option/parameter settings).

2. Extra Stooges are earned by achieving certain score levels (dependent on option/parameter settings).

E. GAME OVER

1. When each player loses his last Stooge, his name with the words Game Over will transfer to the bottom of the screen.

IV. GAME PLAY AND SCORING

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HOW TO PLAY

The object of the "Three Stooges" game is to rescue the three brides, Cora, Nora and Dora from the evil Doctor, I.M.Acad M.D.

One, two or three players can choose their favorite Stooge and play either as a team, or against one another. In a one player game the game is played against the computer.

"Three Stooges" consists of seven scenes: (1) The Office; (2) The Parlor; (3) The Kitchen; (4) The Singers; (5) The Art Gallery; (6) The Police Station; and (7) The Laboratory. The players must pick

up their respectively colored key in each of the seven scenes, and exit the room. Each scene is repeated in all four levels of difficulty.

The game play starts with all three Stooges in the midst of the first scene, the "Office". With the help of the player controlled joystick, the player searches for a hammer. With the hammer the player can either break furniture to find the keys, or hit the cops and villains which are worth points. The player can also pick up pies, which are located on unbreakable tables and throw them

IV. GAME PLAY AND SCORING

at unsuspecting cops and villians. The player must be careful though, because a pie thrown haphazardly will break windows along the sidewalls encouraging more cops to enter the room. Picking up a pie will also cause the player to lose the hammer. If a player chooses to slap a villian by pressing the slap/throw button on the control panel, the villian will be stunned and if a hammer was being carried, it will be dropped.

Each scene is completed when all three keys are retrieved and the Three Stooges exit the room. All three keys must be picked up to open the exit door.

The players must be very careful during the "Singer" scene. The key for each of the players is located in one of the smaller rooms. When entering the room the player must be quick about retrieving the key because the opera singers "blue note" is lethal. The singers can be silenced by hitting them in the face with a pie.

During the first level of the "Laboratory" scene, there are no brides present. The evil Doctor, I.M. Acad M.D., stands atop the laboratory and as the players pick up their keys the Doctor starts leaving the room. The players must exit in time to capture the Doctor or the round begins over again.

The first of the three brides, Cora, appears at the start of the second level "Laboratory" game. The players must retrieve the keys to change the color of the cage in which Cora is locked. The cage must then be broken with a hammer, Cora rescued, and exit the room.

Nora, the second bride appears during the third "Laboratory" round and Dora, the third bride, appears during the fourth "Laboratory" round.

When Dora has been saved, this will complete the first four levels of the game. The game now repeats the order of the first four levels, with the evil Doctor coming out again in the "Laboratory" scene of level five.

BREAKING WINDOW = 100 POINTS

VILLIANS

a. Muffy = 200 POINTS
b. Beauregard = 200 POINTS

COPS (Flatfoot) = 500 POINTS

LOOT

a. Key = 500 POINTS
b. Oscar = 500 POINTS
c. Star = 500 POINTS
d. Money bag = 500 POINTS

SCIENTIST = 500 POINTS

THREE STOOGES

a. Larry = 500 POINTS
b. Moe = 500 POINTS
c. Curly = 500 POINTS



Figure 1. The effect of the concentration of the *Agaricus bisporus* spores on the growth of *Agaricus bisporus* on the substrate. The concentration of the spores was 10⁴ spores/ml (a), 10⁵ spores/ml (b), 10⁶ spores/ml (c), 10⁷ spores/ml (d), 10⁸ spores/ml (e), 10⁹ spores/ml (f), 10¹⁰ spores/ml (g), 10¹¹ spores/ml (h), 10¹² spores/ml (i), 10¹³ spores/ml (j), 10¹⁴ spores/ml (k), 10¹⁵ spores/ml (l), 10¹⁶ spores/ml (m), 10¹⁷ spores/ml (n), 10¹⁸ spores/ml (o), 10¹⁹ spores/ml (p), 10²⁰ spores/ml (q), 10²¹ spores/ml (r), 10²² spores/ml (s), 10²³ spores/ml (t), 10²⁴ spores/ml (u), 10²⁵ spores/ml (v), 10²⁶ spores/ml (w), 10²⁷ spores/ml (x), 10²⁸ spores/ml (y), 10²⁹ spores/ml (z), 10³⁰ spores/ml (aa), 10³¹ spores/ml (ab), 10³² spores/ml (ac), 10³³ spores/ml (ad), 10³⁴ spores/ml (ae), 10³⁵ spores/ml (af), 10³⁶ spores/ml (ag), 10³⁷ spores/ml (ah), 10³⁸ spores/ml (ai), 10³⁹ spores/ml (aj), 10⁴⁰ spores/ml (ak), 10⁴¹ spores/ml (al), 10⁴² spores/ml (am), 10⁴³ spores/ml (an), 10⁴⁴ spores/ml (ao), 10⁴⁵ spores/ml (ap), 10⁴⁶ spores/ml (aq), 10⁴⁷ spores/ml (ar), 10⁴⁸ spores/ml (as), 10⁴⁹ spores/ml (at), 10⁵⁰ spores/ml (au), 10⁵¹ spores/ml (av), 10⁵² spores/ml (aw), 10⁵³ spores/ml (ax), 10⁵⁴ spores/ml (ay), 10⁵⁵ spores/ml (az), 10⁵⁶ spores/ml (ba), 10⁵⁷ spores/ml (bb), 10⁵⁸ spores/ml (bc), 10⁵⁹ spores/ml (bd), 10⁶⁰ spores/ml (be), 10⁶¹ spores/ml (bf), 10⁶² spores/ml (bg), 10⁶³ spores/ml (bh), 10⁶⁴ spores/ml (bi), 10⁶⁵ spores/ml (bj), 10⁶⁶ spores/ml (bk), 10⁶⁷ spores/ml (bl), 10⁶⁸ spores/ml (bm), 10⁶⁹ spores/ml (bn), 10⁷⁰ spores/ml (bo), 10⁷¹ spores/ml (bp), 10⁷² spores/ml (bq), 10⁷³ spores/ml (br), 10⁷⁴ spores/ml (bs), 10⁷⁵ spores/ml (bt), 10⁷⁶ spores/ml (bu), 10⁷⁷ spores/ml (bv), 10⁷⁸ spores/ml (bw), 10⁷⁹ spores/ml (bx), 10⁸⁰ spores/ml (by), 10⁸¹ spores/ml (bz), 10⁸² spores/ml (ca), 10⁸³ spores/ml (cb), 10⁸⁴ spores/ml (cc), 10⁸⁵ spores/ml (cd), 10⁸⁶ spores/ml (ce), 10⁸⁷ spores/ml (cf), 10⁸⁸ spores/ml (cg), 10⁸⁹ spores/ml (ch), 10⁹⁰ spores/ml (ci), 10⁹¹ spores/ml (cj), 10⁹² spores/ml (ck), 10⁹³ spores/ml (cl), 10⁹⁴ spores/ml (cm), 10⁹⁵ spores/ml (cn), 10⁹⁶ spores/ml (co), 10⁹⁷ spores/ml (cp), 10⁹⁸ spores/ml (cq), 10⁹⁹ spores/ml (cr), 10¹⁰⁰ spores/ml (cs), 10¹⁰¹ spores/ml (ct), 10¹⁰² spores/ml (cu), 10¹⁰³ spores/ml (cv), 10¹⁰⁴ spores/ml (cw), 10¹⁰⁵ spores/ml (cx), 10¹⁰⁶ spores/ml (cy), 10¹⁰⁷ spores/ml (cz), 10¹⁰⁸ spores/ml (da), 10¹⁰⁹ spores/ml (db), 10¹¹⁰ spores/ml (dc), 10¹¹¹ spores/ml (dd), 10¹¹² spores/ml (de), 10¹¹³ spores/ml (df), 10¹¹⁴ spores/ml (dg), 10¹¹⁵ spores/ml (dh), 10¹¹⁶ spores/ml (di), 10¹¹⁷ spores/ml (dj), 10¹¹⁸ spores/ml (dk), 10¹¹⁹ spores/ml (dl), 10¹²⁰ spores/ml (dm), 10¹²¹ spores/ml (dn), 10¹²² spores/ml (do), 10¹²³ spores/ml (dp), 10¹²⁴ spores/ml (dq), 10¹²⁵ spores/ml (dr), 10¹²⁶ spores/ml (ds), 10¹²⁷ spores/ml (dt), 10¹²⁸ spores/ml (du), 10¹²⁹ spores/ml (dv), 10¹³⁰ spores/ml (dw), 10¹³¹ spores/ml (dx), 10¹³² spores/ml (dy), 10¹³³ spores/ml (dz), 10¹³⁴ spores/ml (ea), 10¹³⁵ spores/ml (eb), 10¹³⁶ spores/ml (ec), 10¹³⁷ spores/ml (ed), 10¹³⁸ spores/ml (ee), 10¹³⁹ spores/ml (ef), 10¹⁴⁰ spores/ml (eg), 10¹⁴¹ spores/ml (eh), 10¹⁴² spores/ml (ei), 10¹⁴³ spores/ml (ej), 10¹⁴⁴ spores/ml (ek), 10¹⁴⁵ spores/ml (el), 10¹⁴⁶ spores/ml (em), 10¹⁴⁷ spores/ml (en), 10¹⁴⁸ spores/ml (eo), 10¹⁴⁹ spores/ml (ep), 10¹⁵⁰ spores/ml (eq), 10¹⁵¹ spores/ml (er), 10¹⁵² spores/ml (es), 10¹⁵³ spores/ml (et), 10¹⁵⁴ spores/ml (eu), 10¹⁵⁵ spores/ml (ev), 10¹⁵⁶ spores/ml (ew), 10¹⁵⁷ spores/ml (ex), 10¹⁵⁸ spores/ml (ey), 10¹⁵⁹ spores/ml (ez), 10¹⁶⁰ spores/ml (fa), 10¹⁶¹ spores/ml (fb), 10¹⁶² spores/ml (fc), 10¹⁶³ spores/ml (fd), 10¹⁶⁴ spores/ml (fe), 10¹⁶⁵ spores/ml (ff), 10¹⁶⁶ spores/ml (fg), 10¹⁶⁷ spores/ml (fh), 10¹⁶⁸ spores/ml (fi), 10¹⁶⁹ spores/ml (fj), 10¹⁷⁰ spores/ml (fk), 10¹⁷¹ spores/ml (fl), 10¹⁷² spores/ml (fm), 10¹⁷³ spores/ml (fn), 10¹⁷⁴ spores/ml (fo), 10¹⁷⁵ spores/ml (fp), 10¹⁷⁶ spores/ml (fq), 10¹⁷⁷ spores/ml (fr), 10¹⁷⁸ spores/ml (fs), 10¹⁷⁹ spores/ml (ft), 10¹⁸⁰ spores/ml (fu), 10¹⁸¹ spores/ml (fv), 10¹⁸² spores/ml (fw), 10¹⁸³ spores/ml (fx), 10¹⁸⁴ spores/ml (fy), 10¹⁸⁵ spores/ml (fz), 10¹⁸⁶ spores/ml (ga), 10¹⁸⁷ spores/ml (gb), 10¹⁸⁸ spores/ml (gc), 10¹⁸⁹ spores/ml (gd), 10¹⁹⁰ spores/ml (ge), 10¹⁹¹ spores/ml (gf), 10¹⁹² spores/ml (gg), 10¹⁹³ spores/ml (gh), 10¹⁹⁴ spores/ml (gi), 10¹⁹⁵ spores/ml (gj), 10¹⁹⁶ spores/ml (gk), 10¹⁹⁷ spores/ml (gl), 10¹⁹⁸ spores/ml (gm), 10¹⁹⁹ spores/ml (gn), 10²⁰⁰ spores/ml (go), 10²⁰¹ spores/ml (gp), 10²⁰² spores/ml (gq), 10²⁰³ spores/ml (gr), 10²⁰⁴ spores/ml (gs), 10²⁰⁵ spores/ml (gt), 10²⁰⁶ spores/ml (gu), 10²⁰⁷ spores/ml (gv), 10²⁰⁸ spores/ml (gw), 10²⁰⁹ spores/ml (gx), 10²¹⁰ spores/ml (gy), 10²¹¹ spores/ml (gz), 10²¹² spores/ml (ha), 10²¹³ spores/ml (hb), 10²¹⁴ spores/ml (hc), 10²¹⁵ spores/ml (hd), 10²¹⁶ spores/ml (he), 10²¹⁷ spores/ml (hf), 10²¹⁸ spores/ml (hg), 10²¹⁹ spores/ml (hh), 10²²⁰ spores/ml (hi), 10²²¹ spores/ml (hj), 10²²² spores/ml (hk), 10²²³ spores/ml (hl), 10²²⁴ spores/ml (hm), 10²²⁵ spores/ml (hn), 10²²⁶ spores/ml (ho), 10²²⁷ spores/ml (hp), 10²²⁸ spores/ml (hq), 10²²⁹ spores/ml (hr), 10²³⁰ spores/ml (hs), 10²³¹ spores/ml (ht), 10²³² spores/ml (hu), 10²³³ spores/ml (hv

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Figure 1

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VII. BOOKKEEPING AND SELF TEST

SELF TEST

The battery back-up bookkeeping functions of this game are contained in Self Test steps 3 and 4. These are in addition to the electro-mechanical coin counter located inside the front door panel. Every time a coin is inserted into a coin slot, the counter is energized, incrementing the count.

The self-test consists of six functions which may be used to identify problems in the video system and to change program parameters.

The self-test mode is entered by setting the self-test toggle switch located inside the cash door to "TEST". A selection of available tests is displayed on the monitor. To return to the GAME mode at any time, the operator needs only to set the toggle switch back to "GAME".

Selection of tests is done with the push button switch labeled "SELECT". Upon entering the test mode, a flashing arrow points to the first test selection. Momentarily depressing the "SELECT" button will advance through each selection one by one.

When the arrow is pointing to the desired test, the operator may begin that test by pressing the "SELECT" button and holding it down until the test appears on the screen.

Once a test has been selected, the operator can return to the selection list by holding down the select switch until it re-appears. The six tests are as follows:

1. MONITOR ADJUSTMENT

Four patterns can be displayed on the screen for adjusting monitor color, brightness, contrast and convergence. The patterns are: Color bars, a cross-hatch, a gray scale, and a dot pattern. By momentarily pressing the select switch, the operator may cycle through the four patterns.

2. MEMORY TEST

For each RAM memory chip: An OK or an NG (no good) appears signaling that the chip is good or bad respectively.

Check sums are displayed for each ROM memory chip. If you have a suspect ROM, refer to your distributor for the correct check sum number.

3. SOUND/SPEECH TEST

After selecting this test, a count will appear on the screen, representing the various sounds that are produced by the game. All the different game sounds will be produced and the screen count will repeat to 01. Pressing the MOE button will suppress all sound output and speed up the count so a particular sound can be sought out and checked.

4. BOOKKEEPING

Selecting this test will display a menu of four functions. Pushing the SELECT button momentarily will move an arrow on the screen. When the arrow points to the desired function, press the MOE button on the control panel to perform that function.

DISPLAY SCORE COUNTS — A table is shown with 20 categories of score values by thousands (K) and a count associated with each category. The count represents the number of plays in which the score at the end of the game fell into that category. In addition, a high score, low score, and average is shown along with the total number of plays on which the average is based. To clear the table, press the MOE button and return to the menu by holding down SELECT.

DISPLAY TIME COUNTS — Same as above except each category represents play times in seconds. The high, low, and average are given in minutes and seconds.

DISPLAY ROUND COUNTS — Same as above except each category represents the round in which the games ended.

Note: Each of these tables are independent of the others. Any table may be cleared without affecting the others in any way.

RESET HIGH SCORE — Pressing the MOE button will reset the Top Bananas table (all-time high scores).

VII. BOOKKEEPING AND SELF TEST

5. DIP SWITCHES

A functional description of the eight Dip Switches located on the Logic Board Assy. is displayed. Changing any switch will cause an immediate update of the description displayed on the screen.

6. SWITCH TEST

Pressing any player button, coin switch or moving the joysticks in any direction will display an OK for each switch closure.

VIII. GENERAL INFORMATION

A. PRINTED CIRCUIT BOARDS ARE DESIGNATED AS FOLLOWS:

- A1 Logic Board Assy.
- A3 Power Supply Assy.
- A6 Sound Board Assy.
- A7 Diode Board
- A8 Filter Board

B. WIRE COLORS ARE SHOWN AS NUMBERS:

0 Black	5 Green
1 Brown	6 Blue
2 Red	7 Purple
3 Orange	8 Gray
4 Yellow	9 White

For example, 688 is a Blue - Gray - Gray striped wire.

C. FUSES

BOTTOM PANEL

F1	115V AC 60 Hz (Primary Power)	3 Amp SLO-BLO
F2	6.3V AC (Coin Chute Lamps)	1 Amp SLO-BLO
F3	Monitor	2 Amp SLO-BLO
F4	9V AC (+5V DC)	12 Amp SLO-BLO
F5	15V AC $\left(\begin{array}{l} +12V\ DC \\ -12V\ DC \end{array} \right)$	2 Amp SLO-BLO
F6	15V AC $\left(\begin{array}{l} +12V\ DC \\ +20V\ DC \end{array} \right)$	2 Amp SLO-BLO
F7	Audio Amplifier Supply	1.5 Amp SLO-BLO
F8	9V AC ($\overline{\text{RESET}}$)	1/4 Amp SLO-BLO

VIII. GENERAL INFORMATION

POWER SUPPLY SPECIFICATIONS

LOCATION	VOLTAGE	PROTECTION
Logic Board Assy. (A1)	+5V DC	Voltage adjustable. 6 Amps over-voltage protection and fused for over-current protection.
Sound Board. (A6)	+12V DC -12V DC	1.5 Amp fused for over-current protection. The plus and minus 12 volt supplies use the LM340K-12 and LM320T-12 IC regulators respectively.
Coin Meter	+20V DC	Full wave rectified unfiltered voltage, 1.5 Amp fused for over-current protection.
Coin Chute Lights	6.3V AC	AC voltage, 1 amp fused for over-current protection.
Monitor and Marquee	100V AC or 115V AC, 60HZ	Isolated, fused AC voltage.

WARNING: The Shield Top covering the Master Electronics Panel will have to be removed in order to make some adjustments to the printed circuit boards. This cover is used, in part, to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules. Failure to replace the Shield Top over the Master Electronics Panel when the game is in operation voids all warranties.

IX. THEORY OF OPERATION

INTRODUCTION

The character based graphics system designated GG-III has two main subdivisions. The first subdivision is the Central Processor Unit (CPU) which has three partitions:

- a. Microprocessors
- b. Memory
- c. Input and Output ports (I/O)

The Intel 8088 microprocessor is used and 32K bytes of memory is reserved for programming space and has 5 input ports and 5 output ports. The second subdivision is the video state machine which generates and controls the video signal to the monitor. The state machine has three partitions:

- a. System Clock (CLK)
- b. Foreground generator (FGND)
- c. Background generator (BGND)

The system clock is driven by a 20MHZ crystal, divided down for a 5MHZ dot clock.

All inputs and outputs including the video control and general purpose I/O are memory-mapped, (i.e. everything within the system can be addressed in a single segment of 64K addresses as memory).

The video control unit is divided into an "object-oriented" foreground driver and "character-oriented" background driver. The screen resolution is 256 pixels horizontally, and 240 lines vertically for both foreground and background. The CPU communicates with the foreground driver and background driver by writing data into the

designated memory areas in a certain format. The foreground is designed to display moving objects on the screen with a minimum overhead to the processor. The game programs will only have to specify the vertical and horizontal position and the object select number to the foreground driver. The background video supplements the foreground with relatively static figures on the screen. The CPU specifies all the character positions on the screen with desired "character" patterns.

A 5MHZ system clock drives a 9 bit horizontal dot counter and an 8 bit vertical line counter. The horizontal counter counts from 0 to 255 during active scan line and 256 to 317 during horizontal blanking time. When the horizontal counter reaches 317, the horizontal counter resets to 0. At the beginning of the horizontal blanking time (horizontal counter = 256) it increments the vertical counter. The vertical counter counts from 0 to 239 during active vertical scan time and 240 to 255 during vertical blanking time.

The battery backup system supports two battery RAM's that store all of the bookkeeping functions. The battery is maintained at a +3.6V reference by a trickle charge supplied on the logic board regulated by a current limiting resistor. If the AC power to the game is interrupted, the battery allows the RAM's to store the data contained in the Distributors table and the Options/Parameters screen.

X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

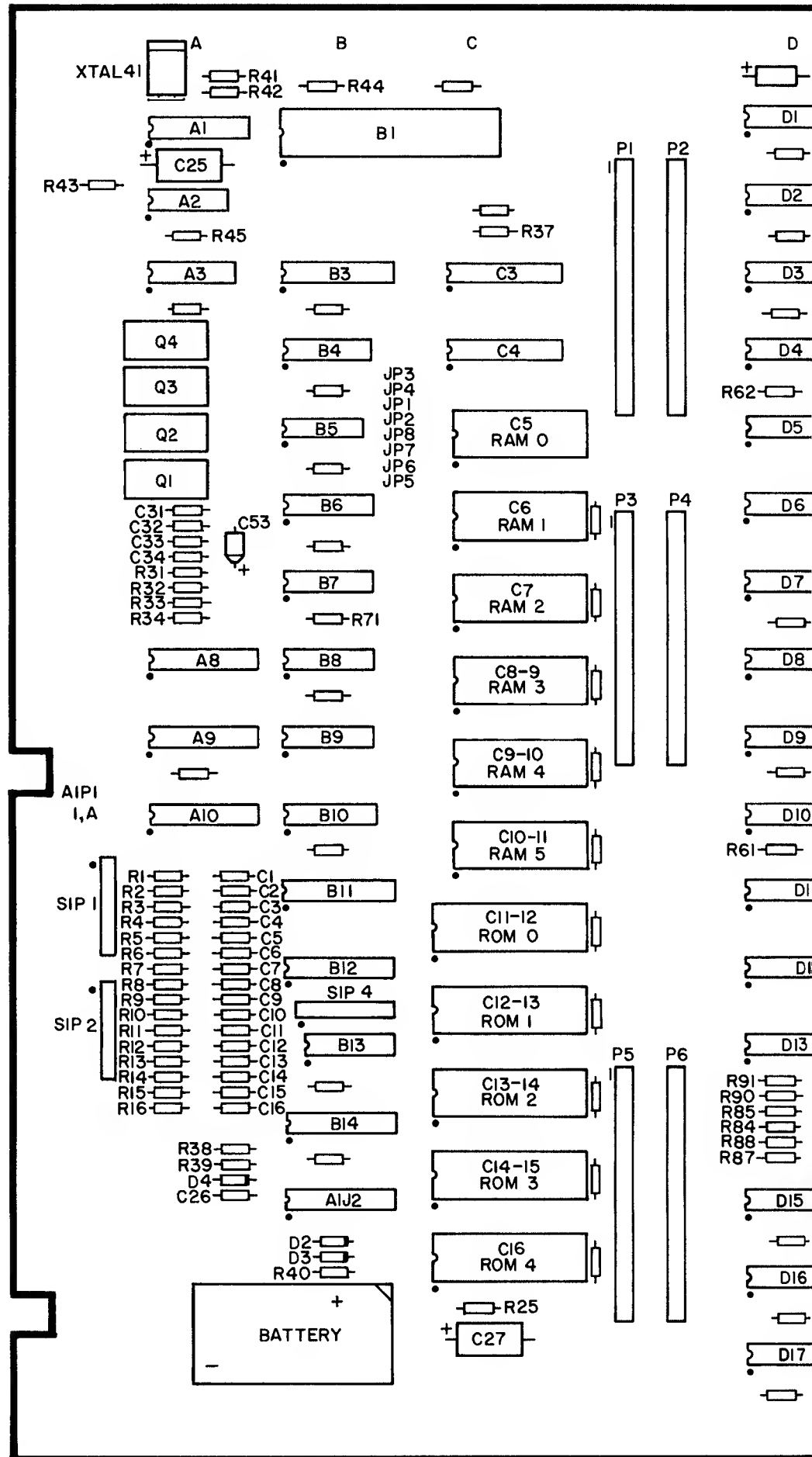
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LOGIC BOARD ASSY. (A1), PARTS LIST

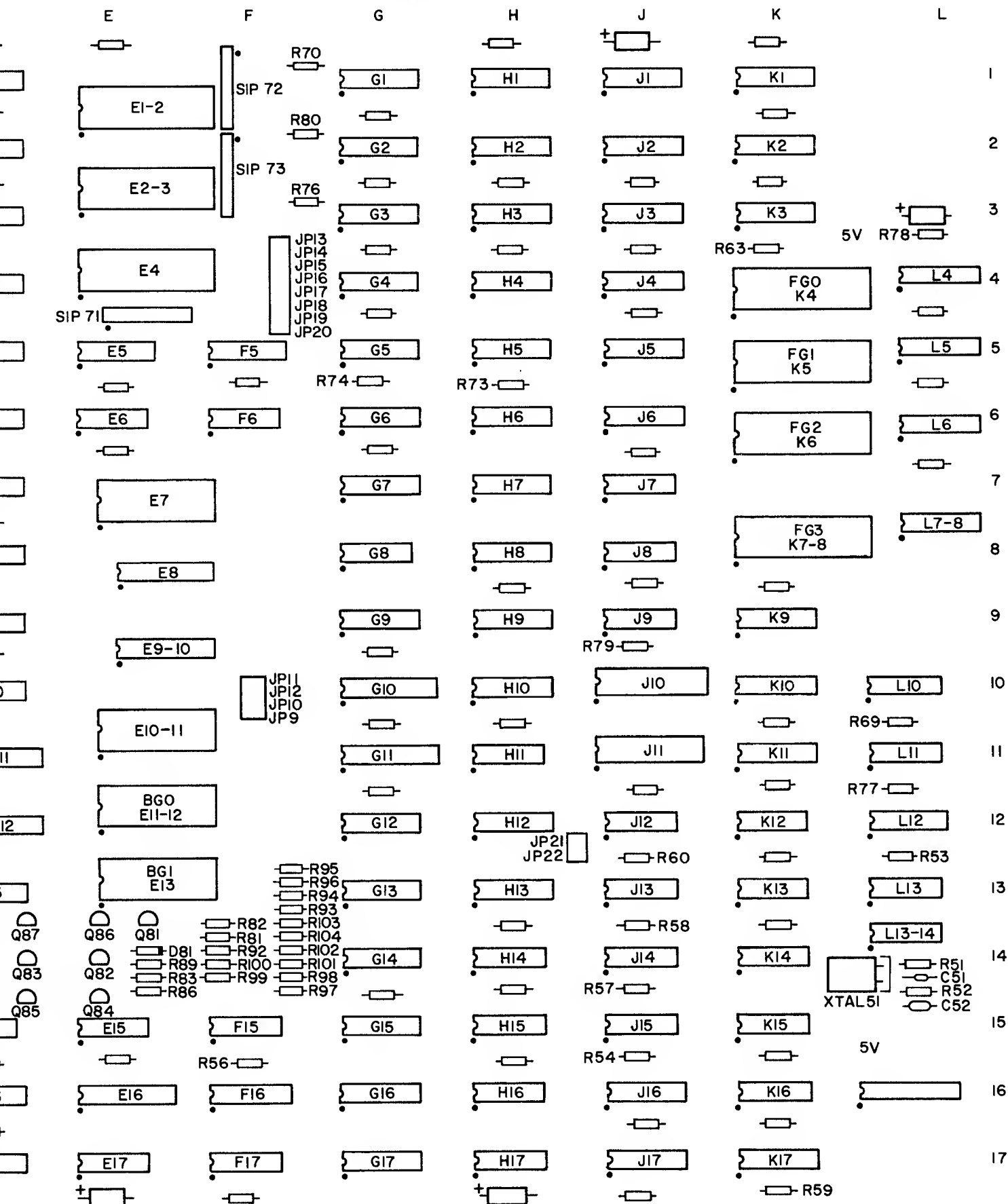
MISCELLANEOUS ELECTRONIC COMPONENTS

REFERENCE	DESCRIPTION	PART NO.
Bat 1	Battery 3.6V	XO-458
C1-C16	Capacitor, 0.1 UF, 50V AX CR +80%-20%	XO-230
C25	Capacitor, 100 UF, 25V EL-AX	XO-212
C26	Capacitor, 0.1 UF, 50V AX CR +80%-20%	XO-230
C27	Capacitor, 100 UF, 25V EL-AX	XO-212
C31-34	Capacitor, 0.1 UF, 50V AX CR +80%-20%	XO-230
C51	Capacitor, 100 PF, 100V CMD 5%	XO-198
C52	Capacitor, 0.1 UF, 100V CMD 5%	XO-196
C53	Capacitor, 10 UF, 25V AX TANT 10%	XO-127
ALL UNMARKED CAPACITORS	01 UF, 50V AX CR +80%-20%	XO-229
ALL POLARIZED UNMARKED CAPACITORS	10 UF, 25V AX TANT 10%	XO-127
D2	Diode, 1N4454	XO-275
D4	Diode, 1N4733A	XO-274
D81	Diode, 1N4148	XO-261
Q1	Transistor, MPS-U45	XO-306
Q2-Q4	Transistor, 2N6044	XO-120
Q81-Q87	Transistor, MPSA70	XO-309
R1-R16	Resistor, 470 OHM, 5% 1/4W	XO-35
R25	Resistor, 1K OHM, 5% 1/4W	XO-5
R31	Resistor, 10K OHM, 5% 1/4W	XO-18
R32-R34	Resistor, 1K OHM, 5% 1/4W	XO-5
R37, R38	Resistor, 330 OHM, 5% 1/4W	XO-34
R39	Resistor, 130 OHM, 5% 1/4W	XO-172
R40	Resistor, 270 OHM, 5% 1/4W	XO-68
R41, R42	Resistor, 510 OHM, 5% 1/4W	XO-25
R43	Resistor, 130 OHM, 5% 1/4W	XO-172
R44, R45	Resistor, 1K OHM, 5% 1/4W	XO-5
R51, R52	Resistor, 330 OHM, 5% 1/4W	XO-34
R53, R54, R56	Resistor, 1K OHM, 5% 1/4W	XO-5
R57, R58	Resistor, 560 OHM, 5% 1/4W	XO-36
R59-R61	Resistor, 1K OHM, 5% 1/4W	XO-5
R63, R64	Resistor, 1K OHM, 5% 1/4W	XO-5
R70	Resistor, 1K OHM, 5% 1/4W	XO-5
R73, R74	Resistor, 1K OHM, 5% 1/4W	XO-5
R76-R80	Resistor, 1K OHM, 5% 1/4W	XO-5
R81	Resistor, 820 OHM, 5% 1/4W	XO-174
R82	Resistor, 100 OHM, 5% 1/4W	XO-28
R83, R84	Resistor, 15 OHM, 5% 1/4W	XO-171
R85	Resistor, 180 OHM, 5% 1/4W	XO-24
R86, R87	Resistor, 15 OHM, 5% 1/4W	XO-171
R88	Resistor, 180 OHM, 5% 1/4W	XO-24
R89, R90	Resistor, 15 OHM, 5% 1/4W	XO-171
R91	Resistor, 180 OHM, 5% 1/4W	XO-24
R92	Resistor, 1K OHM, 5% 1/4W	XO-5
R93	Resistor, 2K OHM, 5% 1/4W	XO-14
R94	Resistor, 1K OHM, 5% 1/4W	XO-5
R95	Resistor, 470 OHM, 5% 1/4W	XO-35
R96	Resistor, 240 OHM, 5% 1/4W	XO-173
R97	Resistor, 2K OHM, 5% 1/4W	XO-14
R98	Resistor, 1K OHM, 5% 1/4W	XO-5
R99	Resistor, 470 OHM, 5% 1/4W	XO-35
R100	Resistor, 240 OHM, 5% 1/4W	XO-173
R101	Resistor, 2K OHM, 5% 1/4W	XO-14
R102	Resistor, 1K OHM, 5% 1/4W	XO-5
R103	Resistor, 470 OHM, 5% 1/4W	XO-35
R104	Resistor, 240 OHM, 5% 1/4W	XO-173
SIP 1, SIP 2, SIP 4	Resistor, Dip, 4 7K, 9 Pin	XO-492
SIP 71, SIP 72, SIP 73	Resistor, Dip, 1K, 9 Pin	XO-493
X-TAL 41	Crystal, 15 MHZ	XO-482
X-TAL 51	Crystal, 20 MHZ	XO-494
	Dip Switch	XO-505
	20 Pin Dip Socket	XO-491
	22 Pin Dip Socket	XO-467
	24 Pin Dip Socket	XO-529
	28 Pin Dip Socket	XO-536
	40 Pin Dip Socket	XO-530



C DIAGRAMS, PARTS LISTS

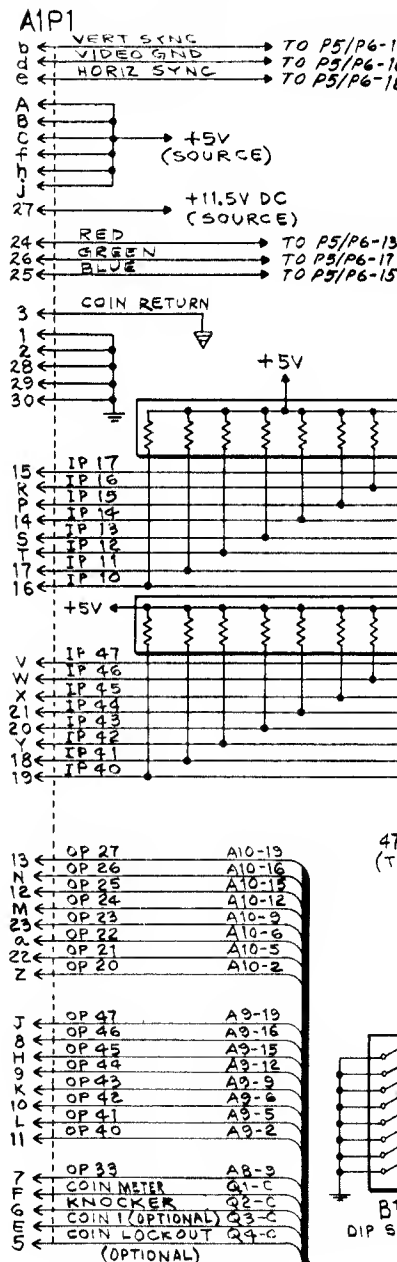
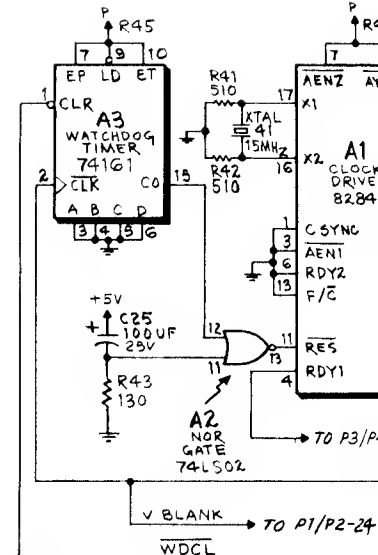
RD ASSY. (A1), COMPONENT LOCATION



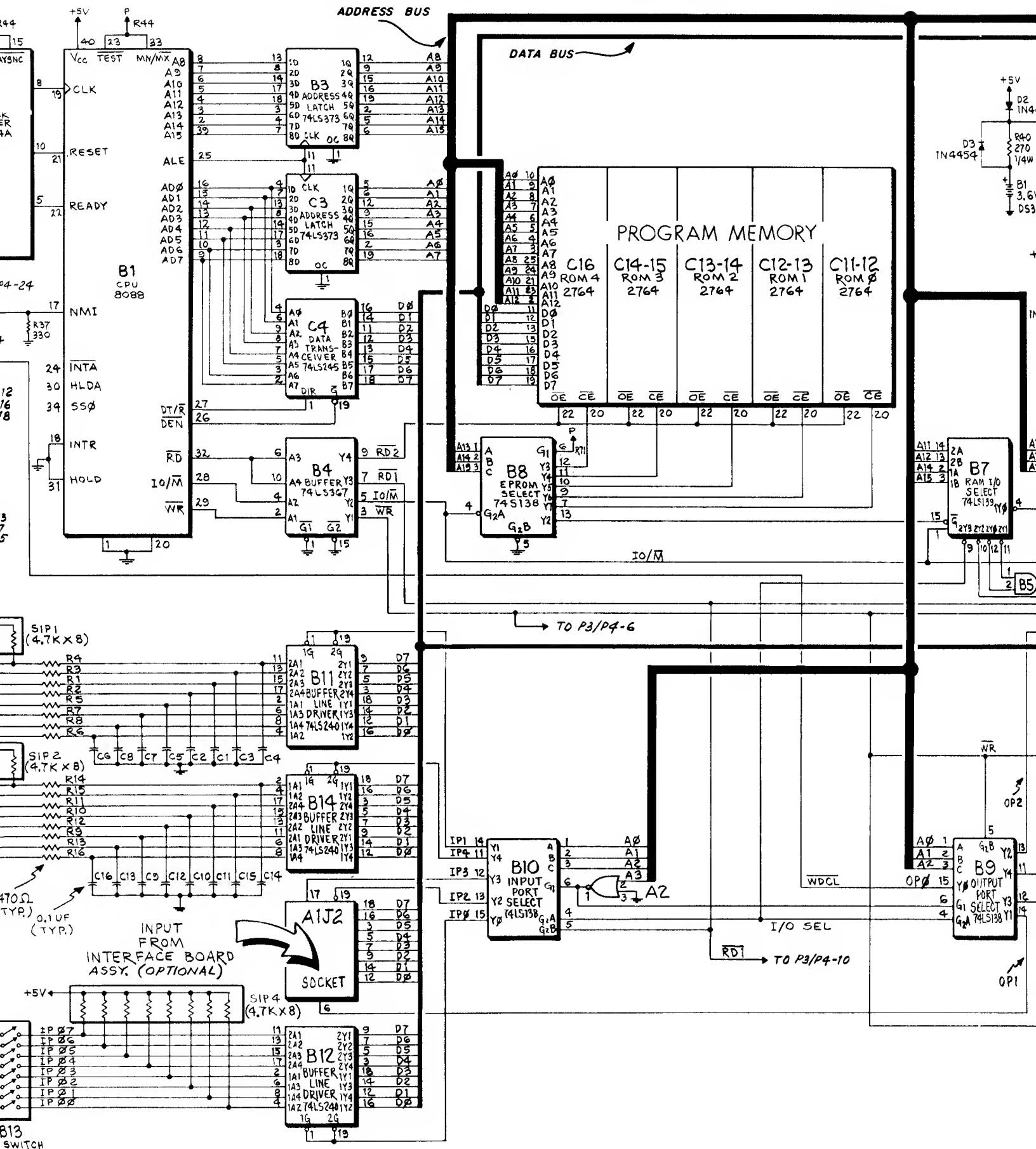
LOGIC BOARD ASSY. (A1), PARTS LIST (CONT.)

INTEGRATED CIRCUITS

REFERENCE	DESCRIPTION	PART NO.	REFERENCE	DESCRIPTION	PART NO.
A1	Logic Board Assy.	MA-646	G7	74157 Quad 2-input multiplexer	XO-114
A2	8284 CLK Driver	XO-478	G8	74LS74 Dual D-type flip flop	XO-434
A3	74LS02 Quad 2-input "NOR" gate	XO-428	G9	74S157 Quad 2-input multiplexer	XO-124
A8, A9, A10	74161 Synchronous 4-bit counter	XO-192	G10	74LS245 Octal bus transceiver	XO-79
B1	74LS377 Octal "D" Flip Flop	XO-97	G11	74LS374 Octal D-type flip flop	XO-96
B3	8088 CPU	XO-490	G12	74LS157 Quad 2-input multiplexer	XO-390
B4	74LS373 Octal D-type flip flop	XO-445	G13, G14, G15	7489 64-bit RAM	XO-88
B5	74LS367 Hex 3-state buffer	XO-444	G16, G17	74LS174 Hex D flip flop	XO-442
B6	74LS08 Quad 2-input "AND" gate	XO-86	H1, H2, H3, H4	74S189 64-bit RAM	XO-89
B7	74HC138 Decoder/demultiplexer	XO-190	H5, H6,	74S161 Synchronous presettable binary counter	XO-488
B8	74LS139 Dual 1 of 4 decoder	XO-419	H7, H8, H9, H10	74LS157 Quad 2-input multiplexer	XO-390
B9, B10	74LS138 1 of 8 decoder	XO-437	H11	74LS260 Dual 5-input "NOR" gate	XO-93
B11, B12, B14	74LS240 Octal Buffer/line driver	XO-91	H12	74LS298 Quad 2-port register	XO-118
C3	74LS373 Octal D-type flip flop	XO-445	H13	74LS157 Quad 2-input multiplexer	XO-390
C4	74LS245 Octal Bus transceiver	XO-79	H14	74LS00 Quad 2-input "NAND" gate	XO-427
C5	RAM 6116LP-4	XO-191	H15	74LS30 8 input "NAND" gate	XO-432
C6	RAM 16116LP-4	XO-191	H16, H17	74LS86 Dual 2-input exclusive "OR" gate	XO-435
C7, C8-9	2128-4, 2Kx8 Static RAM	XO-195	J1, J2, J3,	74S189 64-bit RAM	XO-89
C9-10	ROM 8 2732A 4K x 8 EPROM	XO-485	J4, J5, J6	74LS04 Hex inverter	XO-418
C11-12	ROM 2764 8K x 8 EPROM	XO-489	J7	74LS32 Quad 2-input "OR" gate	XO-433
C12-13	ROM 1 2764 8K x 8 EPROM	XO-489	J8	7408 Quad 2-input "AND" gate	XO-404
C13-14	ROM 2 2764 8K x 8 EPROM	XO-489	J9	93422 256 x 2 bipolar RAM	XO-100
C14-15	ROM 3 2764 8K x 8 EPROM	XO-489	J10, J11	74LS02 Quad 2-input "NOR" gate	XO-428
C16	ROM 4 2764 8K x 8 EPROM	XO-489	J12	74LS74 Dual D-type flip flop	XO-434
D1	74LS139 Dual 1 of 4 Decoder	XO-419	J13	7407 Hex buffer/driver	XO-384
D2, D3, D4, D5,			J14	74LS30 8 input "NAND" gate	XO-432
D6, D7, D8, D9,			J15	74S161 Synchronous presettable binary counter	XO-488
D10	74LS157 Quad 2-input multiplexer	XO-114	J16, J17	74LS379 Quad D-type flip flop	XO-98
D11	74LS374 Octal D-type flip flop	XO-96	K1, K2, K3	FG0 2764-3 8K x 8 EPROM	XO-489
D12	74LS244 Octal buffer/line driver	XO-117	K4	FG1 2764-3 8K x 8 EPROM	XO-489
D13	74LS157 Quad 2-input multiplexer	XO-390	K5	FG2 2764-3 8K x 8 EPROM	XO-489
D15	74LS86 Quad 2-input exclusive "OR" gate	XO-435	K6	FG3 2764-3 8K x 8 EPROM	XO-489
D16	74LS283 4-bit binary full adder	XO-95	K7-8	74LS157 Quad 2-input multiplexer	XO-390
D17	74S161 Synchronous presettable binary counter	XO-488	K9, K10, K11	74LS260 Dual 5-input "NOR" gate	XO-93
E1-2, E2-3, E4	93419 64 x 9 bipolar RAM	XO-99	K12	74LS32 Quad 2-input "OR" gate	XO-433
E5	74LS283 4-bit binary full adder	XO-95	K13	74LS08 Quad 2-input "AND" gate	XO-86
E6	74LS30 8-input "NAND" gate	XO-432	K14	74S04 Hex inverter	XO-400
E7	4801 1K x 8 RAM	XO-193	K15	74LS20 Dual 4-input "NAND" gate	XO-430
E8, E9-10	74LS245 Octal Bus Transceiver	XO-79	K16	74S161 Synchronous presettable binary counter	XO-488
E10-11	4801 1K x 8 RAM	XO-193	K17	74LS166 8-bit shift register	XO-391
E11-12	2128 (BG0) RAM	XO-195	L4, L5, L6, L7-8	74LS74 Dual flip flop	XO-434
E13	2128 (BG1) RAM	XO-195	L10	74LS20 Dual 4-input "NAND" gate	XO-430
E15	74LS86 Quad 2-input exclusive "OR" gate	XO-435	L11	74S161 Synchronous presettable binary counter	XO-488
E16	74LS273 8-bit register	XO-94	L12	74S74 Dual D-type pos edge trig flip flop (T. I. only)	XO-87
E17	74LS20 Dual 4-input "NAND" gate	XO-430	L13-14	74S04 Hex inverter	XO-400
F5	74LS283 4-bit binary full adder	XO-95			
F6	74LS32 Quad 2-input "OR" gate	XO-433			
F15	74LS04 Hex inverter	XO-418			
F16	74S161 Synchronous presettable binary counter	XO-488			
F17	74LS86 Quad 2-input exclusive "OR" gate	XO-435			
G1, G2, G3,					
G4, G5	74LS157 Quad 2-input multiplexer	XO-390			
G6	74LS161 Synchronous presettable binary counter	XO-440			



X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



ADDRESS BUS

DATA BUS

P2

5	A0
7	A1
13	A2
15	A3
9	A4
19	A5
17	A6
23	A7
21	A8

VERT BLANK

1 → +5V

3 → +5V

6 → +5V

8 → +5V

10 → +5V

12 → +5V

14 → +5V

16 → +5V

18 → +5V

20 → +5V

22 → +5V

24 → +5V

26 → +5V

28 → +5V

30 → +5V

32 → +5V

34 → +5V

36 → +5V

38 → +5V

40 → +5V

42 → +5V

44 → +5V

46 → +5V

48 → +5V

50 → +5V

52 → +5V

54 → +5V

56 → +5V

58 → +5V

60 → +5V

62 → +5V

64 → +5V

66 → +5V

68 → +5V

70 → +5V

72 → +5V

74 → +5V

76 → +5V

78 → +5V

80 → +5V

82 → +5V

84 → +5V

86 → +5V

88 → +5V

90 → +5V

92 → +5V

94 → +5V

96 → +5V

98 → +5V

100 → +5V

102 → +5V

104 → +5V

106 → +5V

108 → +5V

110 → +5V

112 → +5V

114 → +5V

116 → +5V

118 → +5V

120 → +5V

122 → +5V

124 → +5V

126 → +5V

128 → +5V

130 → +5V

132 → +5V

134 → +5V

136 → +5V

138 → +5V

140 → +5V

142 → +5V

144 → +5V

146 → +5V

148 → +5V

150 → +5V

152 → +5V

154 → +5V

156 → +5V

158 → +5V

160 → +5V

162 → +5V

164 → +5V

166 → +5V

168 → +5V

170 → +5V

172 → +5V

174 → +5V

176 → +5V

178 → +5V

180 → +5V

182 → +5V

184 → +5V

186 → +5V

188 → +5V

190 → +5V

192 → +5V

194 → +5V

196 → +5V

198 → +5V

200 → +5V

202 → +5V

204 → +5V

206 → +5V

208 → +5V

210 → +5V

212 → +5V

214 → +5V

216 → +5V

218 → +5V

220 → +5V

222 → +5V

224 → +5V

226 → +5V

228 → +5V

230 → +5V

232 → +5V

234 → +5V

236 → +5V

238 → +5V

240 → +5V

242 → +5V

244 → +5V

246 → +5V

248 → +5V

250 → +5V

252 → +5V

254 → +5V

256 → +5V

258 → +5V

260 → +5V

262 → +5V

264 → +5V

266 → +5V

268 → +5V

270 → +5V

272 → +5V

274 → +5V

276 → +5V

278 → +5V

280 → +5V

282 → +5V

284 → +5V

286 → +5V

288 → +5V

290 → +5V

292 → +5V

294 → +5V

296 → +5V

298 → +5V

300 → +5V

302 → +5V

304 → +5V

306 → +5V

308 → +5V

310 → +5V

312 → +5V

314 → +5V

316 → +5V

318 → +5V

320 → +5V

322 → +5V

324 → +5V

326 → +5V

328 → +5V

330 → +5V

332 → +5V

334 → +5V

336 → +5V

338 → +5V

340 → +5V

342 → +5V

344 → +5V

346 → +5V

348 → +5V

350 → +5V

352 → +5V

354 → +5V

356 → +5V

358 → +5V

360 → +5V

362 → +5V

364 → +5V

366 → +5V

368 → +5V

370 → +5V

372 → +5V

374 → +5V

376 → +5V

378 → +5V

380 → +5V

382 → +5V

384 → +5V

386 → +5V

388 → +5V

390 → +5V

392 → +5V

394 → +5V

396 → +5V

398 → +5V

400 → +5V

402 → +5V

404 → +5V

406 → +5V

408 → +5V

410 → +5V

412 → +5V

414 → +5V

416 → +5V

418 → +5V

420 → +5V

422 → +5V

424 → +5V

426 → +5V

428 → +5V

430 → +5V

432 → +5V

434 → +5V

436 → +5V

438 → +5V

440 → +5V

442 → +5V

444 → +5V

446 → +5V

448 → +5V

450 → +5V

452 → +5V

454 → +5V

456 → +5V

458 → +5V

460 → +5V

462 → +5V

464 → +5V

466 → +5V

468 → +5V

470 → +5V

472 → +5V

474 → +5V

476 → +5V

478 → +5V

480 → +5V

482 → +5V

484 → +5V

486 → +5V

488 → +5V

490 → +5V

492 → +5V

494 → +5V

496 → +5V

498 → +5V

500 → +5V

502 → +5V

504 → +5V

506 → +5V

508 → +5V

510 → +5V

512 → +5V

514 → +5V

516 → +5V

518 → +5V

520 → +5V

522 → +5V

524 → +5V

526 → +5V

528 → +5V

530 → +5V

532 → +5V

534 → +5V

536 → +5V

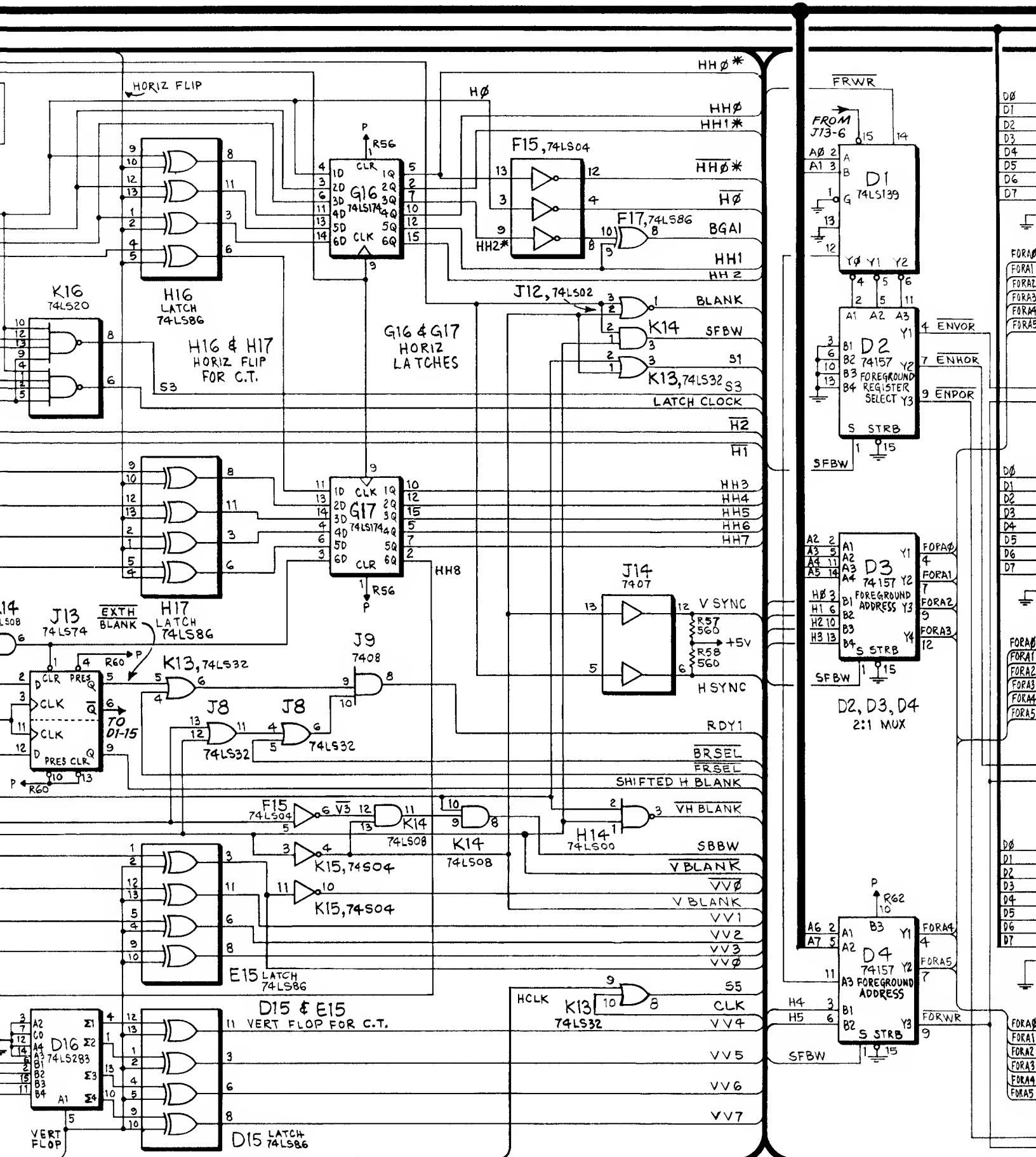
538 → +5V

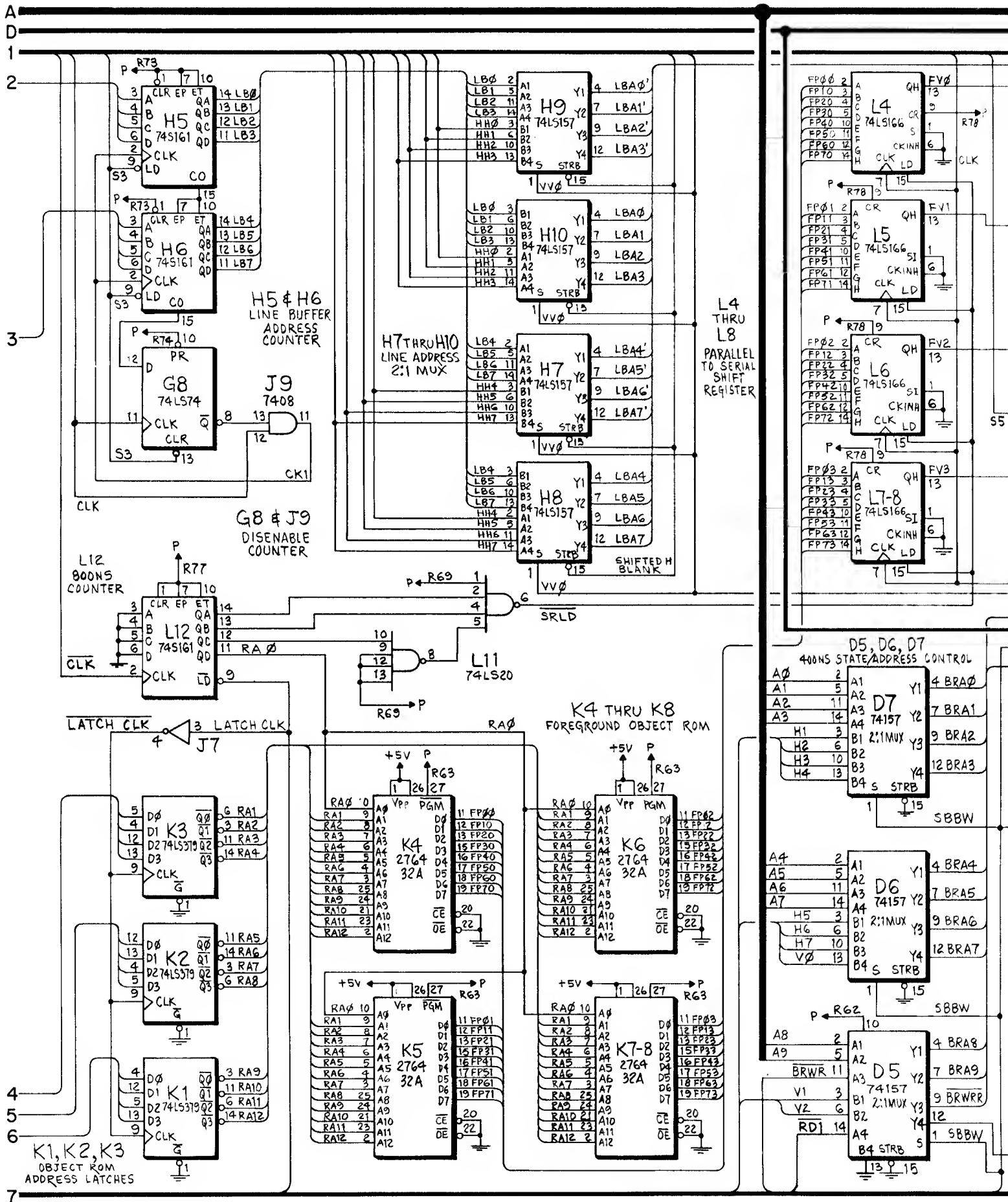
540 → +5V

542 → +5V

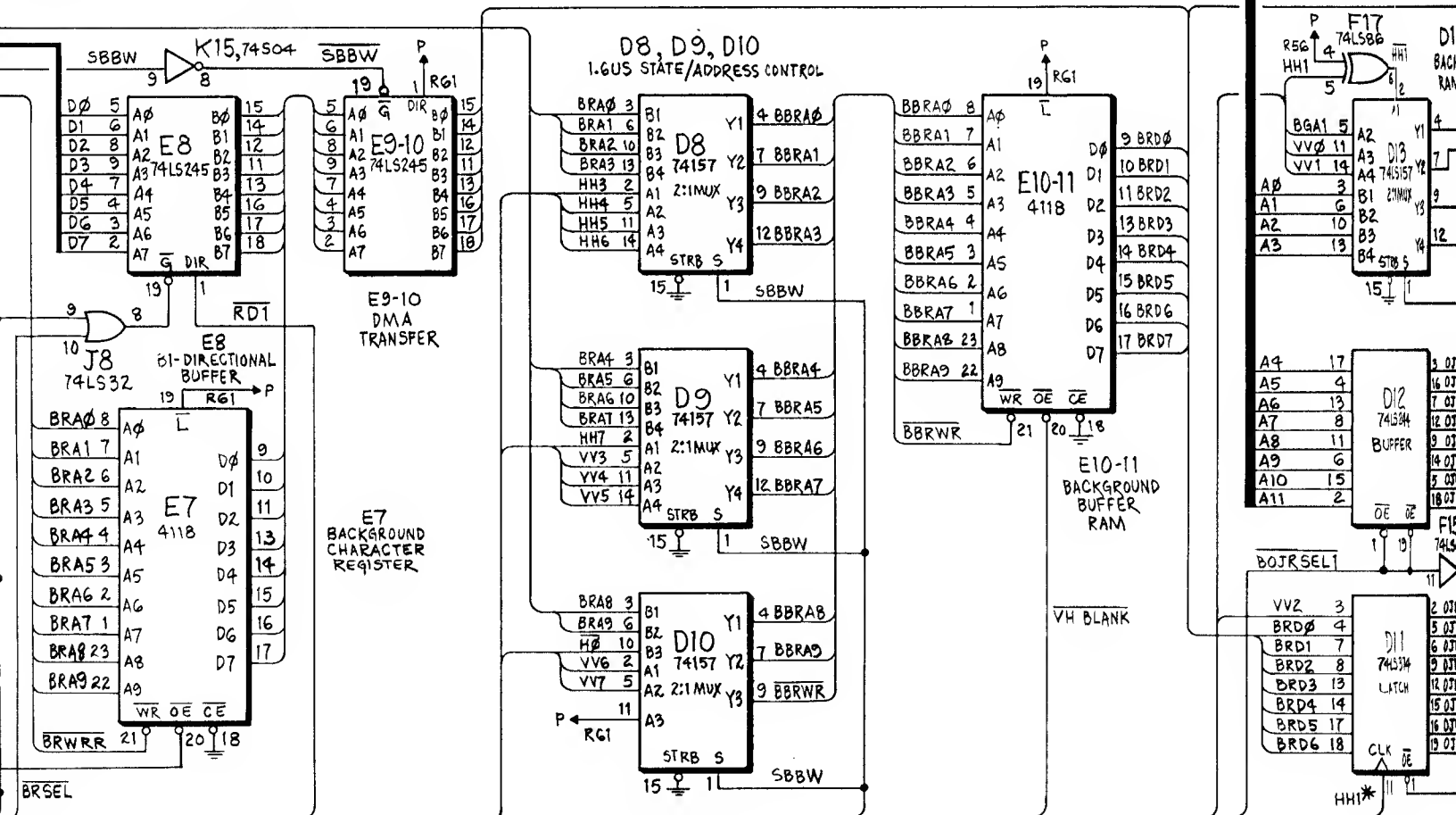
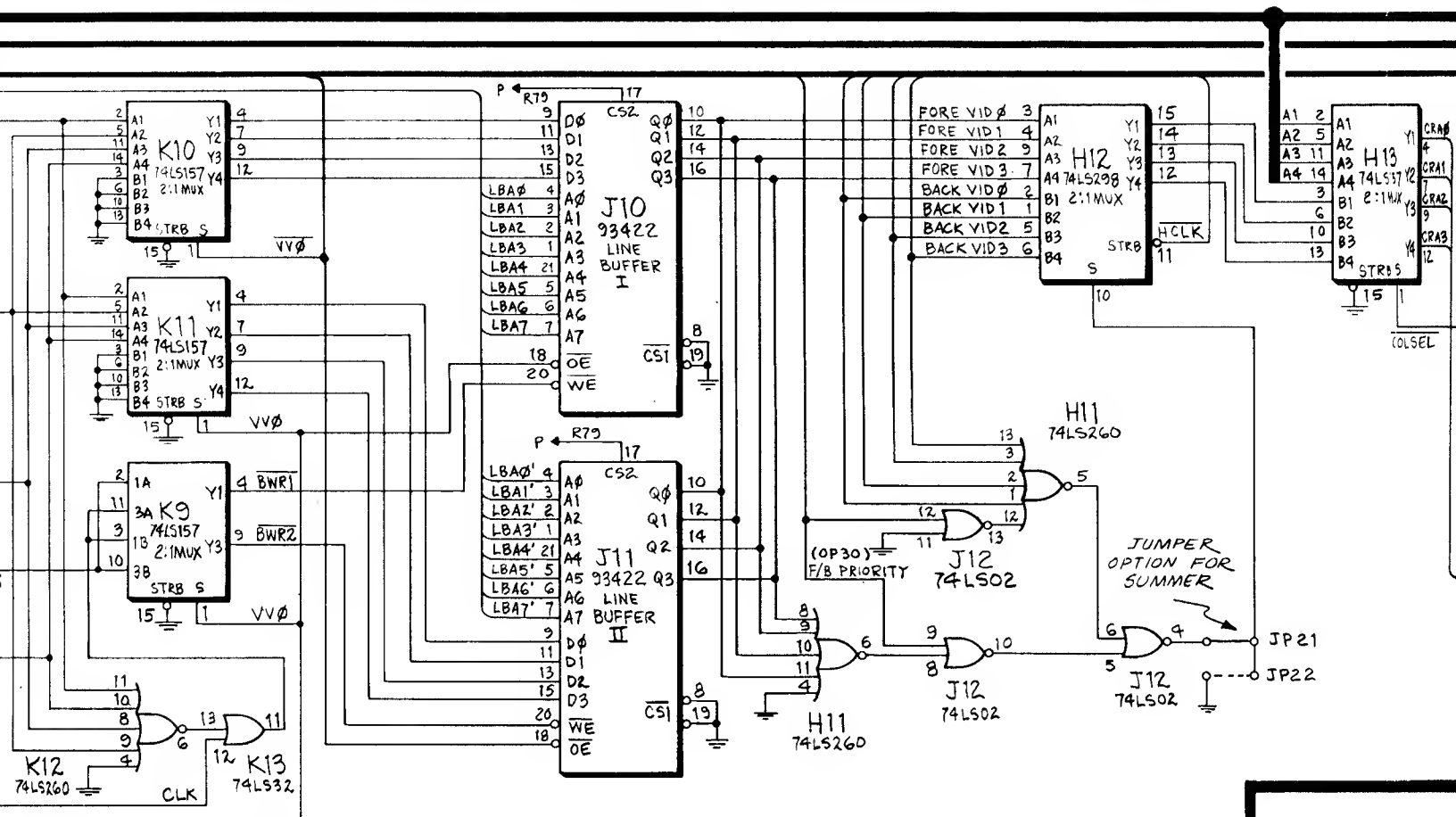
544 → +5V

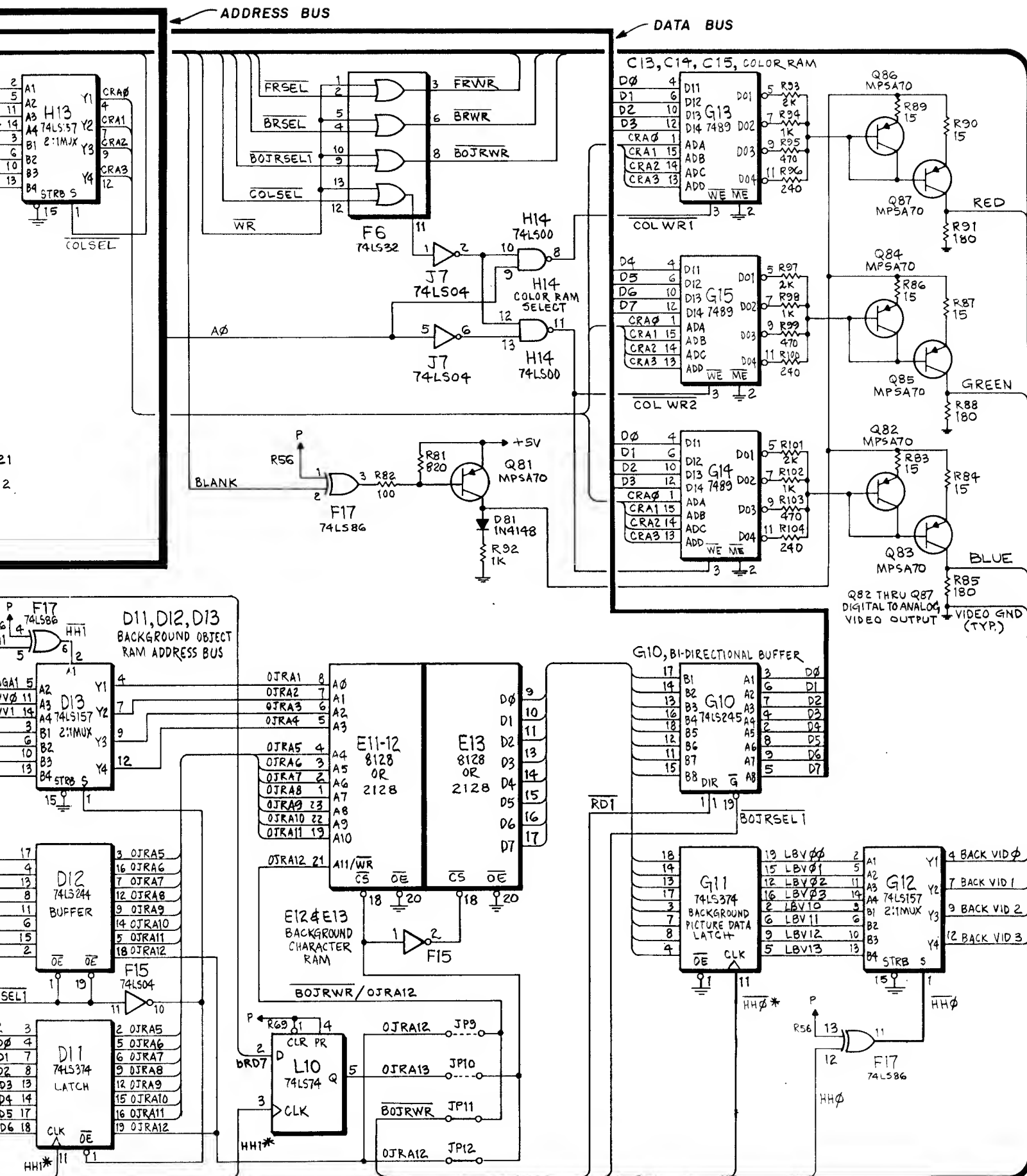
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS





X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

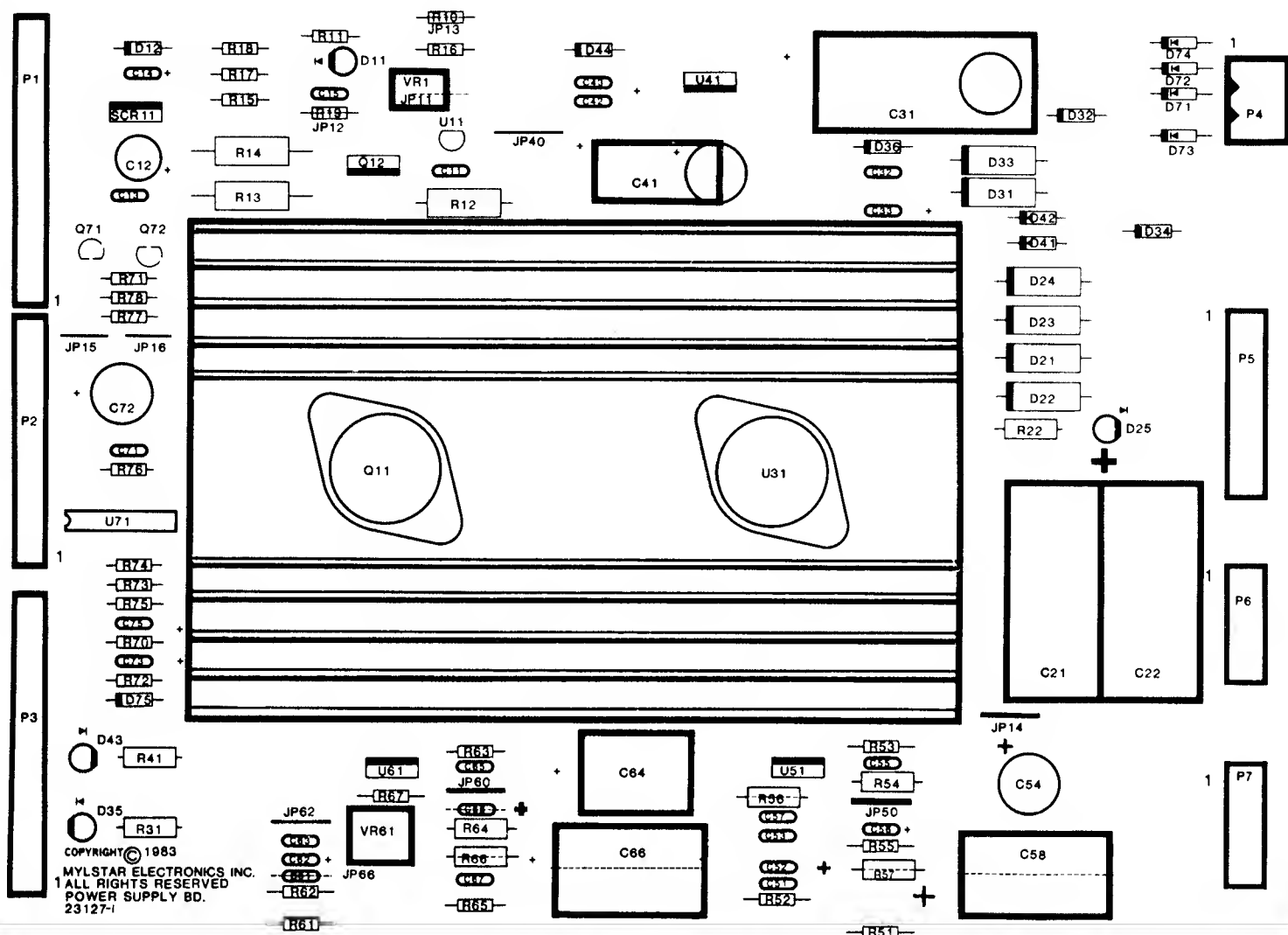




LOGIC BOARD ASSY. (A1), SCHEMATIC DIAGRAM, SHEET 3 OF 3

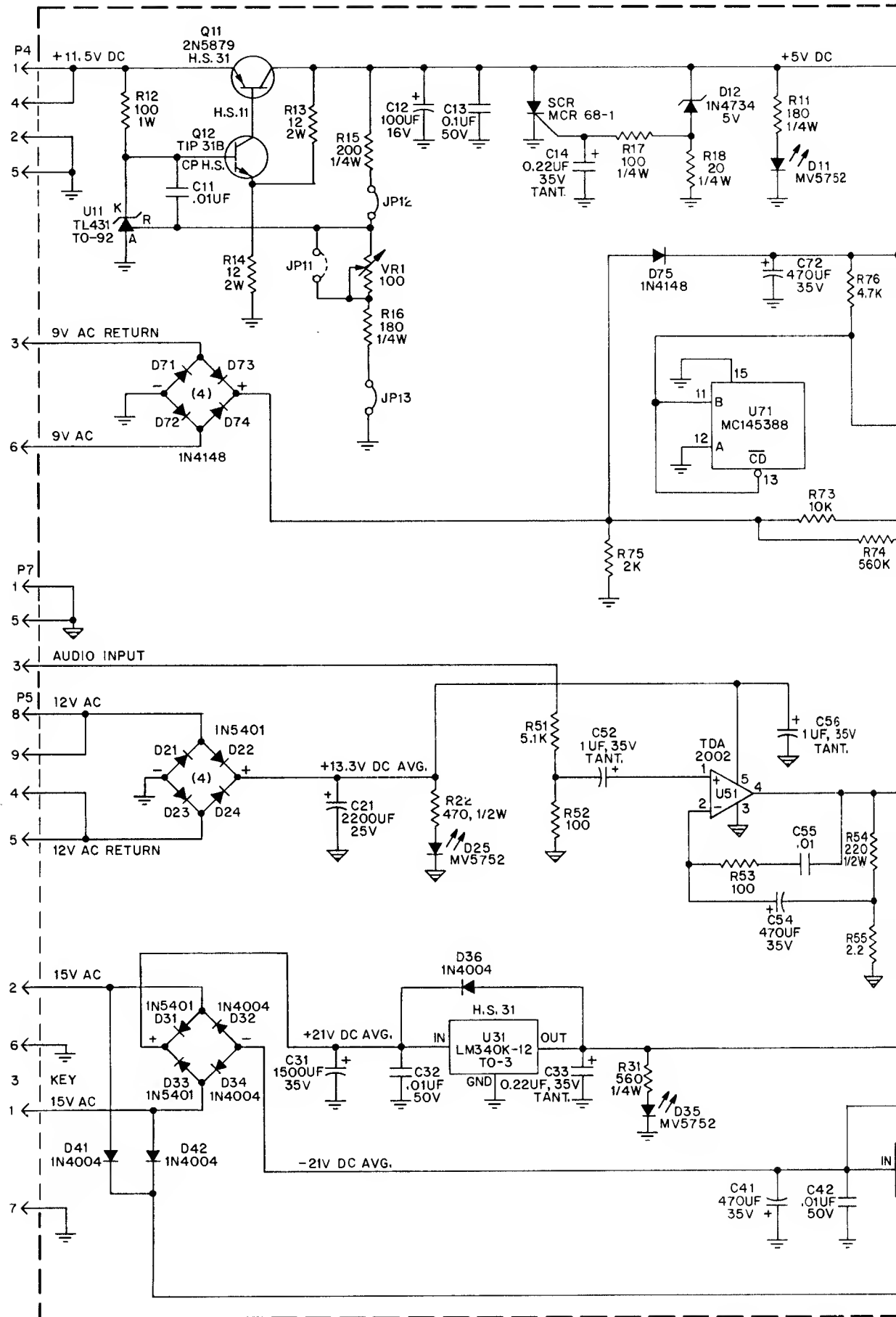
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

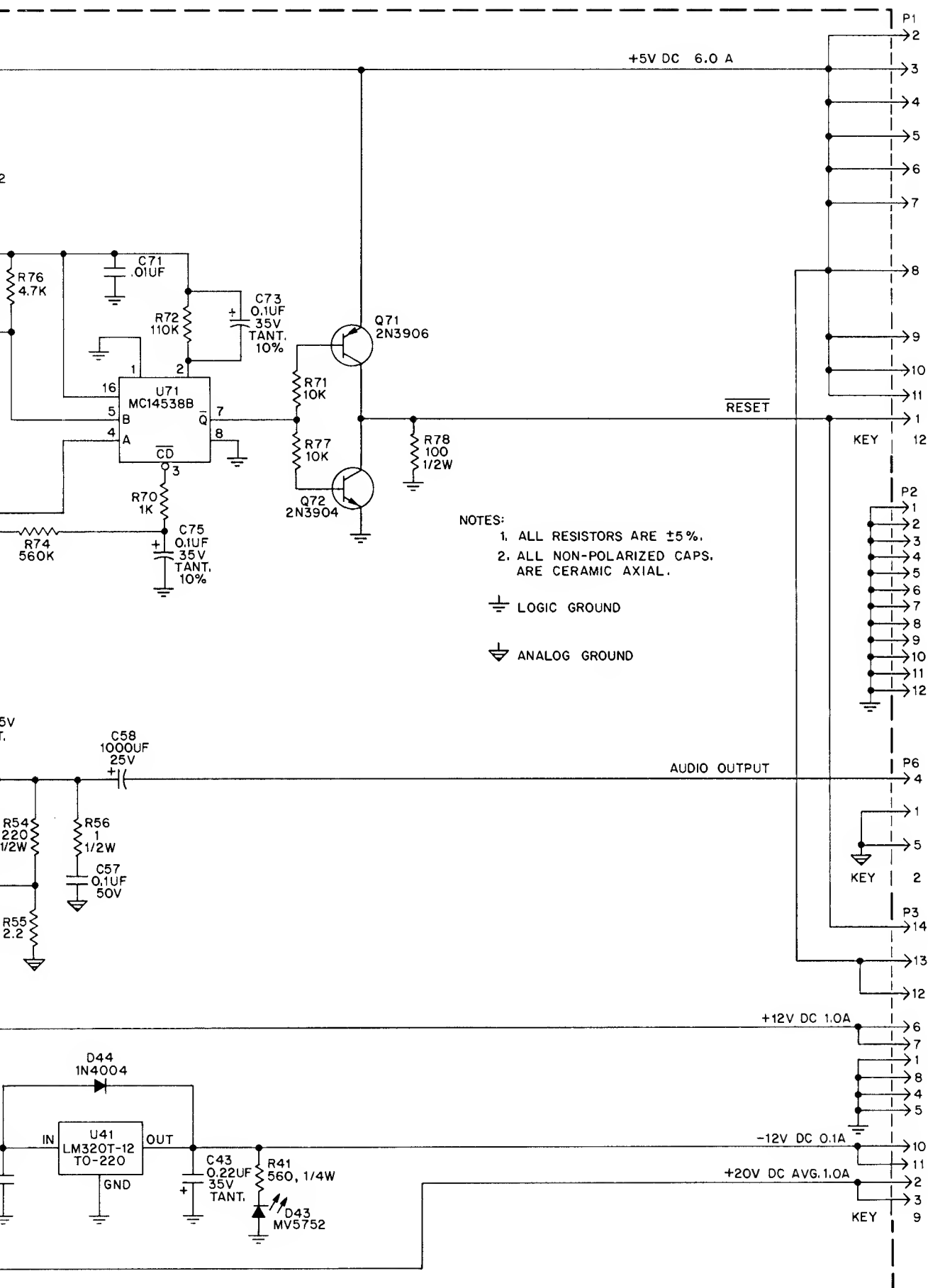
POWER SUPPLY ASSY. (A3), COMPONENT LOCATION



POWER SUPPLY ASSY. (A3), PARTS LIST

REFERENCE	DESCRIPTION	PART NO.	REFERENCE	DESCRIPTION	PART NO.
C11, C32, C42, C55, C71	Power Supply Assembly	MA-479	R12	Resistor, 100 OHM, 5%, 1W	XO-137
C12	Capacitor, .01UF, 50V	XO-229	R13, R14	Resistor, 12 OHM, 5%, 3W	XO-138
C13, C57	Capacitor, 100UF, 16V	XO-235	R15	Resistor, 200 OHM, 5%, ¼W	XO-143
C14, C33, C43	Capacitor, .1UF, 50V	XO-558	R17, R52, R53	Resistor, 100 OHM, 5%, ¼W	XO-28
C21	Capacitor, .22UF, 35V	XO-615	R18	Resistor, 20 OHM, 5%, ¼W	XO-29
C31	Capacitor, 2200UF, 25V	XO-346	R22	Resistor, 470 OHM, 5%, ½W	XO-55
C41, C54, C72	Capacitor, 1500UF, 35V	XO-616	R31, R41	Resistor, 560 OHM, 5%, ¼W	XO-36
C52, C56	Capacitor, 470UF, 35V	XO-284	R51	Resistor, 51.1K OHM, 5%, ¼W	XO-40
C58	Capacitor, 1UF, 35V	XO-715	R54	Resistor, 220 OHM, 5%, ½W	XO-185
C73, C75	Capacitor, 1000UF, 25V	XO-218	R55	Resistor, 2.2 OHM, 5%, ¼W	XO-595
D11, D25, D35, D43	Capacitor, .1UF, 35V	XO-614	R56	Resistor, 1 OHM, 5%, ½W	XO-593
D12	Diode, Light Emitting MV-5752	XO-270	R70	Resistor, 1K OHM, 5%, ¼W	XO-5
D21-D24, D31, D33	Diode, Zener, 5.6V, 1N4734A	XO-255	R71, R73, R77	Resistor, 10K OHM, 5%, ¼W	XO-18
D32, D34, D36, D41, D42, D44	Diode, 1N5401	XO-263	R72	Resistor, 110K OHM, 5%, ¼W	XO-591
D71-D75	Diode, 1N4004	XO-254	R74	Resistor, 560K OHM, 5%, ¼W	XO-704
O11	Diode, 1N4148	XO-261	R75	Resistor, 2K OHM, 5%, ¼W	XO-14
O12	Transistor, PNP, 2N5879	XO-323	R76	Resistor, 4.7K OHM, 5%, ¼W	XO-7
O71	Transistor, TIP31B	XO-641	R78	Resistor, 100 OHM, 5%, ½W	XO-52
O72	Transistor, PNP, 2N3906	XO-588	SCR68-1	Silicon Controlled Rectifier	XO-131
R11, R16	Transistor, NPN, 2N3904	XO-549	U11	Voltage Regulator, Zener TL431	XO-272
	Resistor, 180 OHM, 5%, ¼W	XO-24	U31	Voltage Regulator, -12V, LM340K	XO-628
			U41	Voltage Regulator, -12V, LM320T	XO-613
			U51	Audio Amplifier, LM200T	XO-550
			U71	IC, CMOS	XO-564
			VR1	Potentiometer, 100 OHM	XO-134

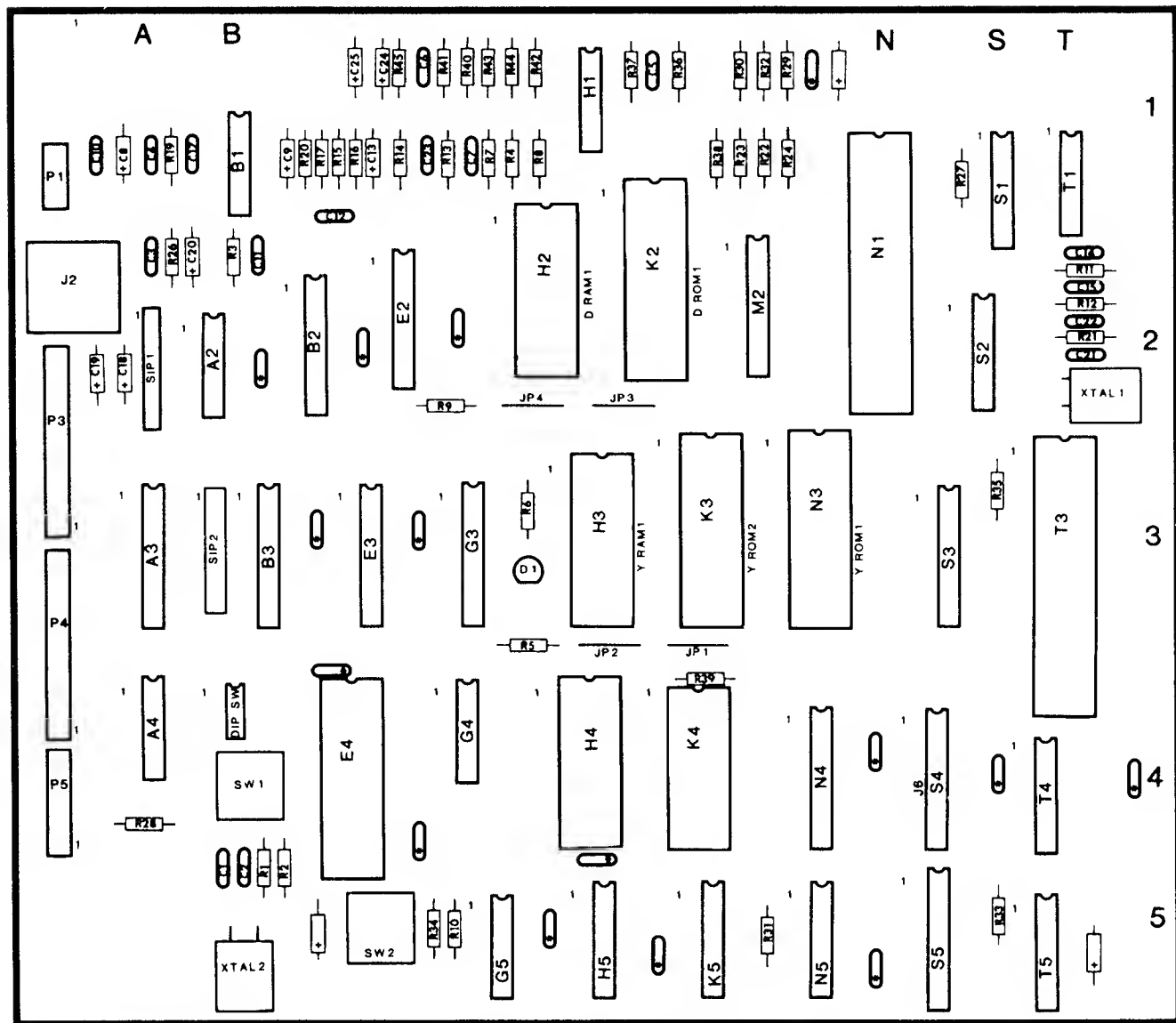




POWER SUPPLY ASSY. (A3), SCHEMATIC DIAGRAM

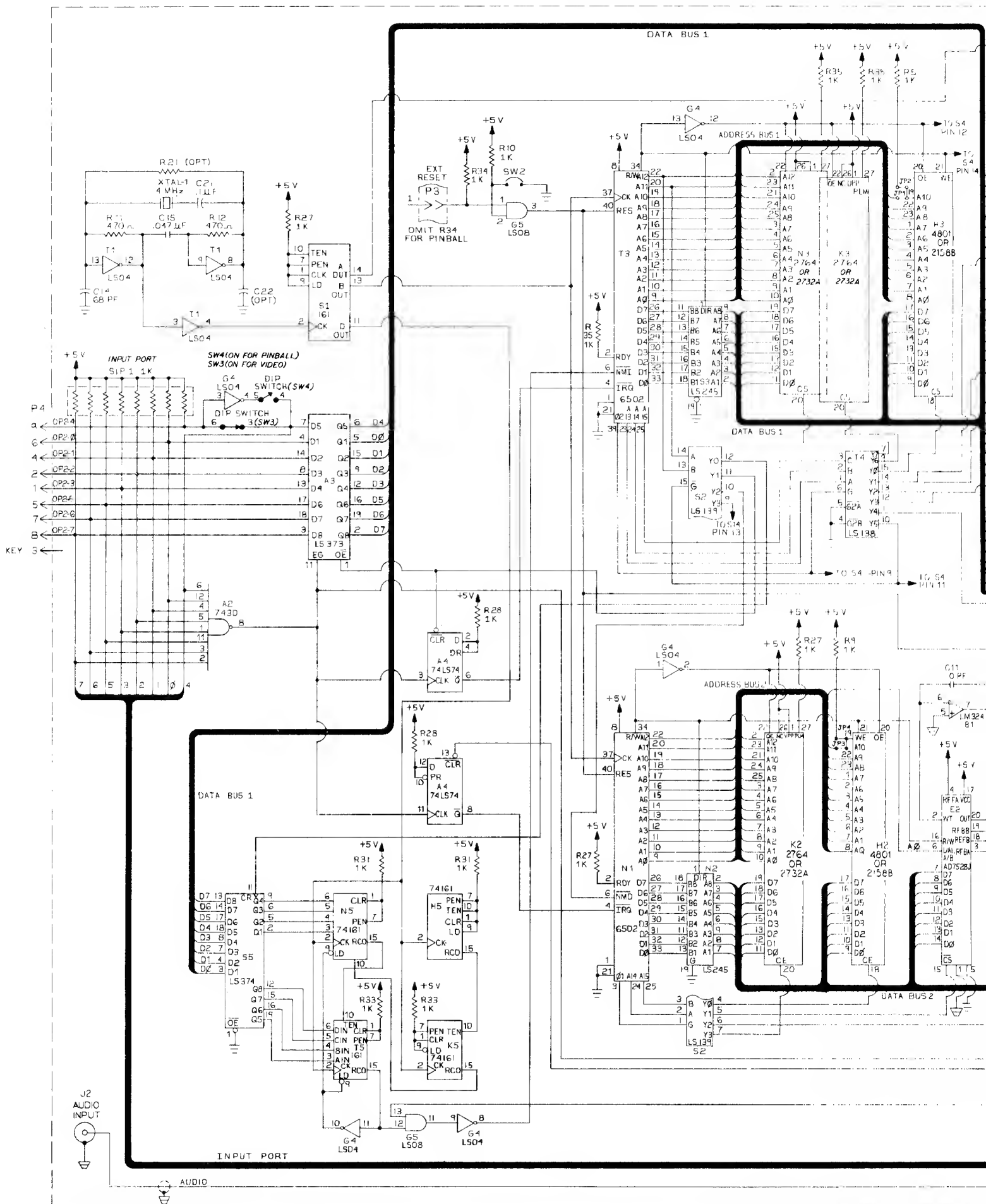
X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS

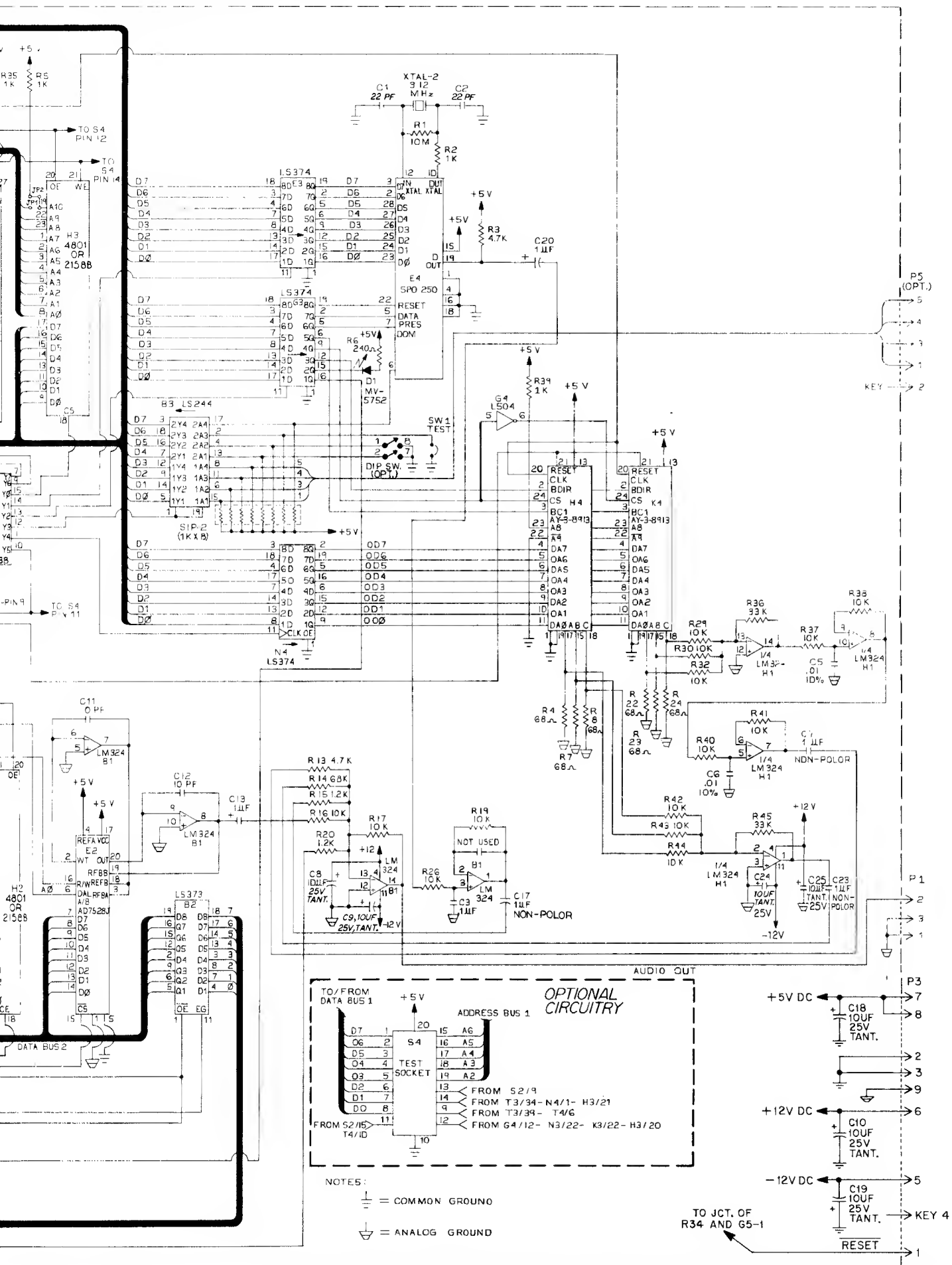
SOUND BOARD (A6) COMPONENT LOCATION



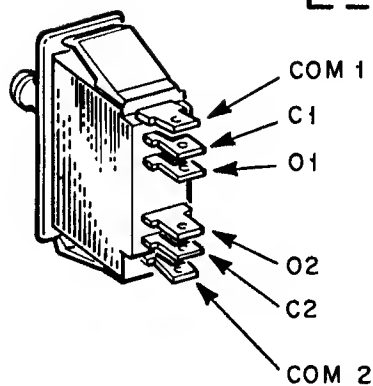
SOUND BOARD (A6) PARTS LIST

REFERENCE	DESCRIPTION	PART NO.	REFERENCE	DESCRIPTION	PART NO.
C1, C2	Sound Board Assy	MA-495	R6	Resistor, 240 OHM, 5% 1/4W	XO-173
	Capacitor, 22PF, 50V MONO	XO-633	R11, R12	Resistor, 470 OHM, 5% 1/4W	XO-35
C3, C21	AX-CM, 10%		R14	Resistor, 6.8K OHM, 5% 1/4W	XO-8
	Capacitor, 0.1UF, 50V MONO	XO-637	R15, R20	Resistor, 1.2K OHM, 5% 1/4W	XO-175
C5, C6	AX-GL		R16, R17, R19,	Resistor, 10K OHM, 5% 1/4W	XO-18
	Capacitor, .01UF, 50V MONO	XO-747	R26, R29, R30,		
C7, C17, C23	AX-GL, 10%		R32, R37, R38,		
	Capacitor, 1UF, 50V CM-RD	XO-294	R40-R44		
C8, C9, C10	Non-Polarized		R36, R45	Resistor, 33K OHM, 5% 1/4W	XO-43
C18, C19, C24,	Capacitor, 10UF, 25V	XO-127	SIP1, SIP2	Resistor Pack, Sip, 1K OHM, 9 Pin	XO-493
C25	TANT-AX, 10%		SW1, SW2	Switch, Push Button, N.O	XO-365
C11	Capacitor, 10PF, 50V AX-CM,	XO-635	XTAL1	Crystal, 4.0 MHz	XO-366
	+80%-20%		XTAL2	Crystal, 312 MHz	XO-529
C13, C20	Capacitor, 1UF, 50V TANT-AX	XO-217		24 Pin DIP Socket	XO-536
C14	Capacitor, 68PF, 50V MONO	XO-636	A2	28 Pin DIP Socket	XO-530
C15	AX-CM, 10%		A3, B2	40 Pin DIP Socket	XO-643
	Capacitor, .047UF, 50V MONO	XO-638	A4	7430 8-input "NAND" gate	XO-445
ALL UNMARKED			B1, H1	74LS373 Octal D-type flip flop	XO-434
CAPACITORS	0.1UF, 50V CM-AX	XO-230	B3	74LS74 Dual D-type flip flop	XO-644
ALL UNMARKED				LM324 Quad op-amp	XO-117
POLARIZED				74LS244 Octal buffer/	
CAPACITORS	10UF, 25V TANT-AX, 10%	XO-127		line driver	
D1	Diode, MV5752	XO-270	E2	AD7528J DAC	XO-647
DIP SW	DIP Switch, 4 Position, 8 Pin	XO-640	E3, G3, N4, S5	74LS374 Octal D-type flip flop	XO-96
J2	Phone Jack	XO-744	E4	SP0250 Speech generator	XO-645
P1	3 Pin Water Conn	XO-703	G4, T1	74LS04 Hex inverter	XO-418
P3, P4	9 Pin Water Conn	XO-375	G5	74LS08 Quad 2-input "AND" gate	XO-86
R1	Resistor, 10M OHM, 5% 1/4W	XO-73	H2, H3	4801 1K x 8 SRAM	XO-193
R2, R5, R9,	Resistor, 1K OHM, 5% 1/4W	XO-5	H4, K4	AY-3-8913 Sound generator	XO-646
R10, R27, R28, R31,			H5, K5, N5,	74161 Synchronous presettable	XO-192
R33-R35, R39			SI, T5	binary counter	
R3, R13	Resistor, 4.7K OHM, 5% 1/4W	XO-7	K2, K3, N3	2732A 4K x 8 EPROM	XO-485
R4, R7, R8,	Resistor, 68 OHM, 5% 1/4W	XO-748	N1, T3	R6502-13 CPU	XO-360
R22-R24			N2, S3	74LS245 Octal bus transceiver	XO-79
			S2	74LS139 Dual 1 of 4 decoder	XO-419
			T4	74LS138 1 of 8 decoder/	XO-437
				demultiplexor	






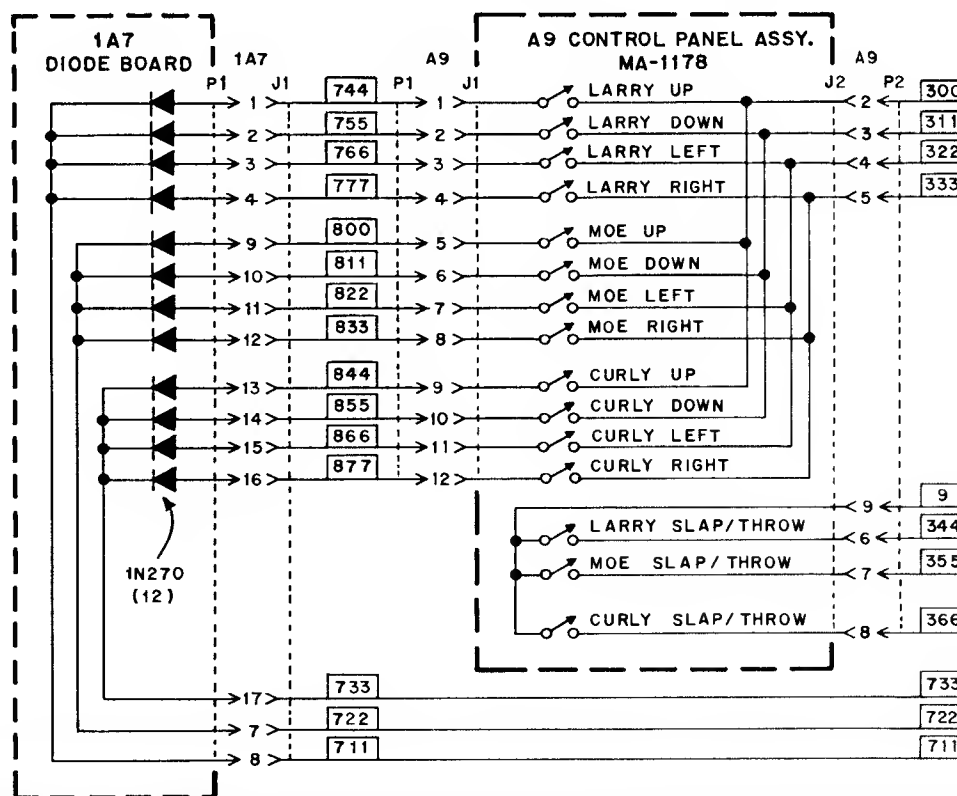


SOUND BOARD ASSY. (A6), SCHEMATIC DIAGRAM

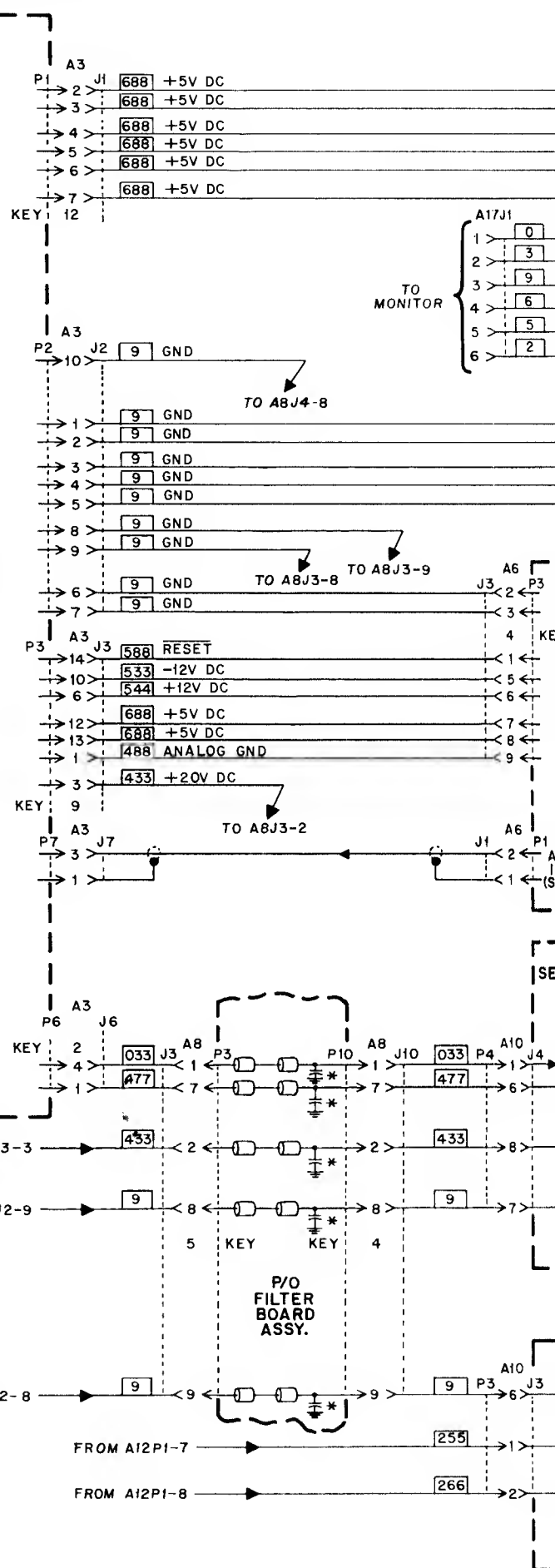
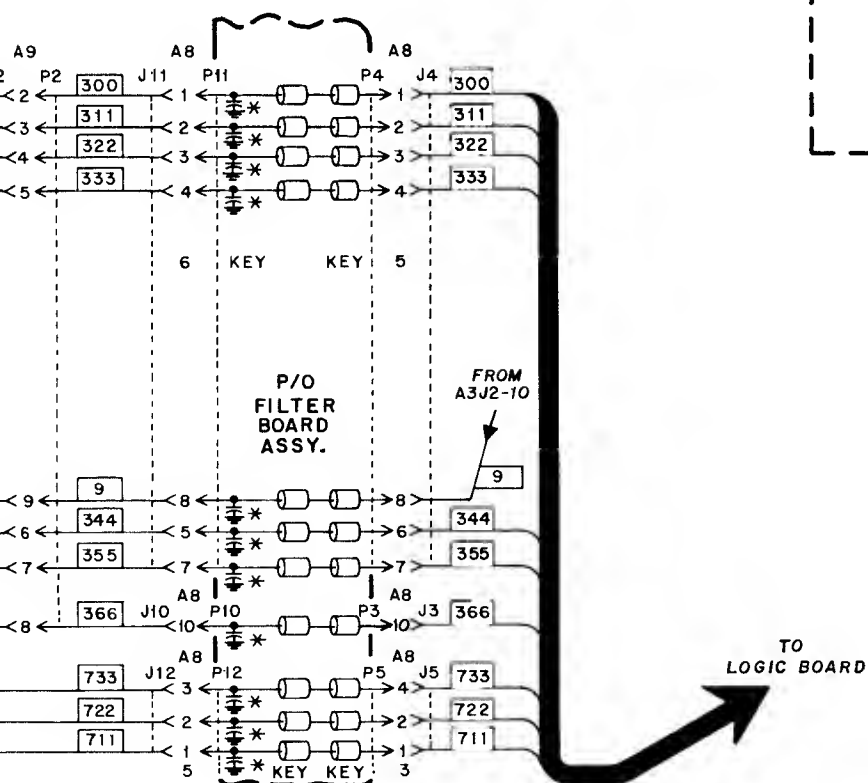
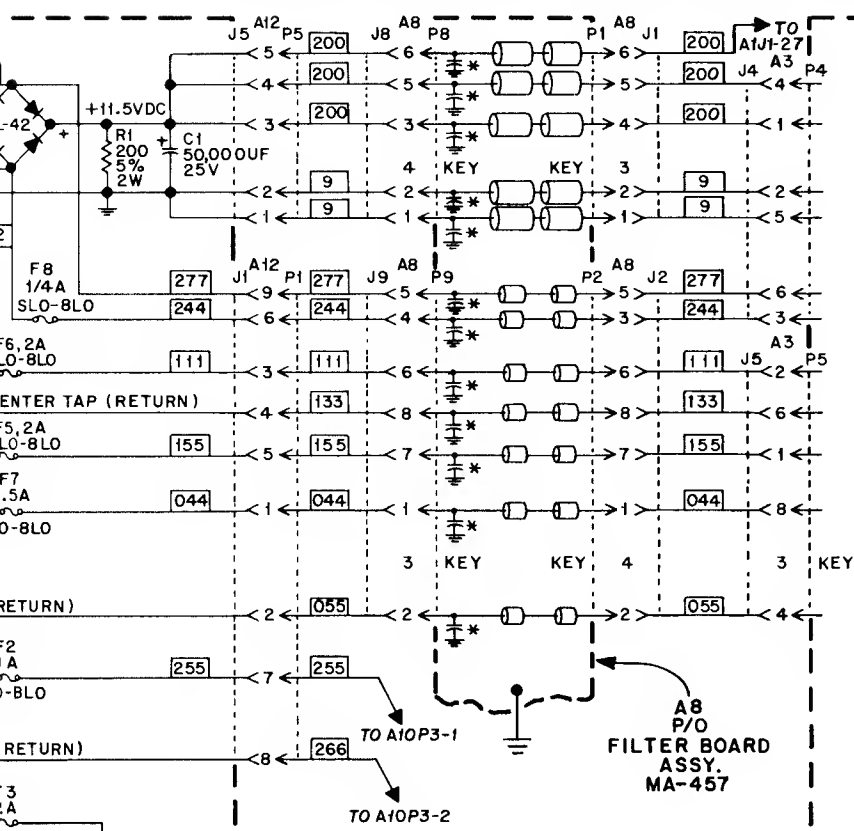


COLOR CODE	
0	BLACK
1	BROWN
2	RED
3	ORANGE
4	YELLOW
5	GREEN
6	BLUE
7	PURPLE
8	GRAY
9	WHITE

1.  INDICATES WIRE COLOR.
2.  INDICATES CIRCUIT GROUND.
3.  INDICATES EARTH GROUND.
4. * INDICATES .01UF
5. ** INDICATES 39PF



X. WIRING AND SCHEMATIC DIAGRAMS, PARTS LISTS



XI. PARTS INFORMATION

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XI. PARTS INFORMATION

SPEAKER/MARQUEE ASSY., ILLUMINATION ASSY.

ITEM	DESCRIPTION	PART NO.
1.	Illumination Assy.	MA-622
2.	Starter	EL-69
3.	Ballast (60HZ)	EL-70
4.	Lamp, Fluorescent	LA-4
5.	Cable Assy. (Illumination)	MA-626
6.	Speaker Assy.	MA-459
7.	Speaker	EL-83
8.	Speaker Grill	20931
9.	Illumination Trim	23067
10.	Cable Assy. (Speaker)	MA-318
11.	Marquee, Lexan	24080

CONTROL PANEL ASSY.

ITEM	DESCRIPTION	PART NO.
1.	Control Panel Assy.	MA-1178
2.	Short Button;	
	White	21970
	Green	24041
	Blue	24042
3.	Button Holder and Switch (3)	21971
4.	Joystick (3)	23189
5.	Cable Assy.	MA-633
6.	Lexan Overlay	24079

SERVICE PANEL ASSY.

ITEM	DESCRIPTION	PART NO.
1.	Service Panel Assy.	MA-620
2.	Cable Assy.	MA-624
3.	Switch (Pushbutton)	EL-57
4.	Switch (Toggle)	23506
5.	Volume Control	XO-199
6.	Coin Meter	EL-84

BOTTOM PANEL ASSY.

ITEM	DESCRIPTION	PART NO.
1.	Bottom Panel Assy.	MA-618
2.	Transformer	23149
3.	Capacitor, 50,000UF, 25V	XO-342
4.	Resistor, 200 Ohm, 5%, 2W	XO-142
5.	Fuse, 3 Amp, SLO-BLO	EL-9
6.	Cable Assy. (Secondary)	MA-630
7.	Fuse, 1 Amp, SLO-BLO	EL-6
8.	Fuse, 12 Amp, SLO-BLO	FSI-83
9.	Bridge Rectifier	EL-42
10.	Fuse, 2 Amp, SLO-BLO	EL-7
11.	1.5 Amp, SLO-BLO	EL-34
12.	1/4 Amp, SLO-BLO	EL-5
13.	Service Outlet	18133
14.	Line Filter	EL-50
15.	Cable Assy. (Primary)	MA-631

XI. PARTS INFORMATION

CABINET PARTS (INTERIOR)

ITEM	DESCRIPTION	PART NO.
1.	Back Door	23073
2.	Interconnect Cable	MA-635
3.	Cable Assembly, Master Electronics	MA-636
4.	Bottom Panel Assembly	MA-618
5.	Sound/Speech Board Assembly	MA-1181
6.	Power Supply Assembly	MA-479
7.	Logic Board Assembly	MA-1182
8.	Filter Board Assembly	MA-457
9.	Shield, Top	22632
10.	Shield, Bottom	22633
11.	Clamp Bracket, Shield	22631
12.	Cable Assembly, High Voltage	MA-619
13.	Cable Assembly, Monitor	22620
14.	Cable Assembly, Front Door	MA-625
15.	Line Cord, Bushing and Plate	23366
16.	Rear Door Lock	23975
17.	Anchor Plate, Lock	23967
18.	Slam Switch and Bracket	23791

CABINET PARTS (EXTERIOR)

ITEM	DESCRIPTION	PART NO.
1.	Lexan Overlay	24095
2.	Side Decal (2)	24103
3.	Top Glass	24039
4.	CRT Frame	24081
5.	Monitor Filter Glass	22849
6.	Monitor Mask	22463
7.	Monitor	21981
8.	Interlock Switch	EL-66
9.	Cover, Interlock Switch	21888
10.	Leg Adjuster	MH-21
11.	On-Off Switch	23799
12.	Switch Plate	18769
13.	Vent Channel	21754

FILTER BOARD

ITEM	DESCRIPTION	PART NO.
	Filter Board Assy.	MA-457
A8P1	6 Pin Wafer Conn.	XO-373
A8P2	9 Pin Wafer Conn.	XO-375
A8P3	10 Pin Wafer Conn.	XO-336
A8P4	8 Pin Wafer Conn.	CO-339
A8P5	7 Pin Wafer Conn.	XO-335
A8P6	4 Pin Wafer Conn.	XO-369
A8P7	7 Pin Wafer Conn.	XO-335
A8P8	6 Pin Wafer Conn.	XO-373
A8P9	9 Pin Wafer Conn.	XO-375
A8P10	10 Pin Wafer Conn.	XO-336
A8P11	8 Pin Wafer Conn.	XO-339
A8P12	7 Pin Wafer Conn.	XO-335
A8P13	4 Pin Wafer Conn.	XO-369
A8P14	7 Pin Wafer Conn.	XO-335
	Capacitor, .01UF, 50V CM-AX +80%-20% (38 each)	XO-229
	Capacitor, 39PF, 50V CM-AX (6 each)	XO-334
	Ferrite Bead (22 each)	XO-337
	Ferrite Bead (66 each)	XO-338

LIMITED WARRANTY

Mylstar Electronics, Inc. warrants to the initial purchaser of the Mylstar Electronics, Inc. machine that the items listed in the following schedule as installed and used in the original Mylstar Electronics, Inc. machine will for the applicable period set forth in the schedule, computed from the initial date of purchase from an authorized Mylstar Electronics, Inc. distributor, be free of defects in materials and workmanship:

SCHEDULE

GAME	ITEM	WARRANTY PERIOD
Pinball	All Electronic Printed circuit boards	90 days
Pinball-Video	All Electronic Printed Circuit Boards	90 days
	Card Cage	90 days
	Television Monitor	30 days
Video	All Electronic Printed Circuit Boards	90 days
	Television Monitor	30 days
Video Disc	Video Disc Player	60 days

This Limited Warranty does not apply to any parts damaged in the course of handling or assembling by the customer or damage due to other than normal use or use in violation of instructions or reasonable practices, or further damaged in return shipment. This Limited Warranty is made only to the original customer, and is and shall be in lieu of all other warranties expressed or implied, and of all other obligations or liabilities on the part of Mylstar Electronics, Inc. and in no event shall Mylstar Electronics, Inc. be liable for any anticipated profits, consequential damages, loss of time, or other losses incurred by the customer in connection with the purchase or operation of Mylstar Electronics, Inc. machines or components thereof.

The registration card with each Mylstar Electronics, Inc. factory-wired machine must be filled in and returned to Mylstar Electronics, Inc. within ten days after date of purchase for this Limited Warranty to be effective. This Limited Warranty applies only to machines so registered.

THIS LIMITED WARRANTY IS IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS, AND OF ANY OTHER OBLIGATION ON THE PART OF THE SELLER AND MYLSTAR ELECTRONICS, INC.



**MYLSTAR
ELECTRONICS
INC.**



MYLSTAR ELECTRONICS, INC.

**165 West Lake Street
Northlake, Illinois 60164**

Tel (312) 562-7400

Telex 72-8463

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